

# EPR NEWSLETTER

Volume 4, Number 1

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Spring, 1992

This publication is the official newsletter of the INTERNATIONAL EPR(ESR) SOCIETY. It is supported by the Society, by corporate and other donors, and by three national Centers for EPR/ESR spectroscopy in the USA. These Centers are sponsored by the Division of Research Resources, U.S. National Institutes of Health:

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(IERC also operates a satellite site for EPR *in vivo* at Dartmouth University in Hanover, New Hampshire; ☎: 603-650-1955; FAX 1255. E-mail: harold.swartz@dartmouth.edu)

These Centers, which were described in our first issue (Volume 1, #1), cooperate to facilitate research requiring EPR-related techniques. Prospective collaborative or service users may contact the staff at any of the Centers.

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**HOW TO REACH US** — To communicate about the EPR Newsletter or submit material, contact R. Linn Belford, Editor or Becky Gallivan, Editorial Assistant, at IERC (address above).

**PUBLICATION AND DISTRIBUTION:** *This is a members' issue. EPR Newsletters are published quarterly for the members (ca. 1000) of the International EPR (ESR) Society. One issue (which was the winter issue in 1991) each year is public, which the (ca. 2000) nonmembers on our mailing list also receive. The publication date indicates approximately when an issue goes to press. Much of the distribution is by volunteer effort (including some by JEOL and a great deal by Bruker, USA as part of their support for the Society) and often by bulk mail. Dated material such as meeting notices thus should be sent to the editor as early as possible to insure that it reaches the readers well before the critical dates.*

## INTERNATIONAL EPR SOCIETY

### MESSAGES FROM THE PRESIDENT

1. **CONSTITUTION:** For your convenience, this issue of the EPR Newsletter (Appendix) reprints the Constitution of the International EPR/ESR Society. This printing incorporates all corrections which have been called to our attention.

2. **MEMBERSHIP:** A recent count of our membership reveals that we now have passed the third-power-of-ten mark with more than 1000 members residing in 53 different countries. This size of membership should be very helpful in receiving recognition and support for EPR studies from colleagues and institutions. We should not, however, slack in our attempts to involve more eligible individuals, especially the younger ones, in the society.

2. **ELECTION OF OFFICERS:** By at least some reckoning, by the end of this calendar year our officers will have served the three years specified by the constitution. The nominating committee soon will be preparing a slate of nominees for the next set of officers. Please feel encouraged to communicate your suggestions to me or the chairs of the nominating committee (Arthur Schweiger and Piotr Fajer). We also will be electing some additional members of the Council and therefore solicit your suggestions in this regard, especially to help achieve greater balance for the geographic and disciplinary extent of the Society.

3. **MEMBERSHIP DUES:** As indicated by the excellent newsletter, the Society award for excellence in EPR (Dr. George Feher this year, as previously announced), the travel grants awarded to young investigators, the co-sponsorship of meetings and workshops, etc., your Society has been very efficient and effective. In order to continue to do so we not only need to have a substantial membership, but *we also need to have them pay their dues*

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*in a timely manner.* Shortly we will send individual statements to those of you in hard-currency countries who are in arrears on your dues, but it would be appreciated and more economical if you would pay them before we have to send out such notices. (Second-best would be to pay dues *immediately* upon receipt of the notices.)

#### 4. SUPPORT OF COLLEAGUES IN EMERGING COUNTRIES AND COUNTRIES IN TRANSITION:

The tremendous political and social changes of the past two years have opened up many opportunities for communication and cooperation with scientists who previously had very restricted access to the rest of the world. The accompanying economic problems, however, have blunted or even reversed the benefits of such freedom. At the level of the Society we are trying to help by the awarding of travel awards, establishing procedures for payment of dues in soft currency, and facilitating communications but there is much, much more that needs to be and can be done on an individual level. Perhaps the most acute needs are for equipment and journals. As has been noted in letters to the editor in our Newsletter, even old equipment and journals may provide assets that are of great value to our colleagues. Please look at what items you may have that you could make available and then — either directly or through the Society (contact me as shown on p. 19) — make them accessible to those who can use them.

Harold M. Swartz

#### CONFERENCE TRAVEL GRANTS FOR STUDENTS - CALL FOR APPLICATIONS AND "VENERABLE EPR SPECTROMETER" CONTEST ENTRIES:

The International EPR Society provides travel grants to students (including postdoctoral student members of the Society) to help defray their expenses in traveling a long distance to present EPR-related work at an appropriate conference (see "Notices of Meetings" in each Newsletter). A student may apply for an award of up to \$250(US) in a

brief (1-2 page) letter with (1) some information about him/herself, (2) reasons for wishing to attend and present work at the particular meeting specified, and (3) the endorsement of the student's research advisor. The Awards Committee makes all decisions and announces results to all applicants. Send applications to Prof. L. J. Berliner, co-Chair, IES Awards Committee, Dept. of Chemistry, The Ohio State University, 120 West 18th Ave., Columbus, OH 43210-1173, USA. ☎: 614-292-0134; E-Mail: [berliner@livers.mps.ohio-state.edu](mailto:berliner@livers.mps.ohio-state.edu)

The Awards Committee will offer a travel grant to a student designated by the winner of the contest entitled "Who has the oldest working commercial EPR spectrometer?" Prof. Gareth and Sandra Eaton announced this contest in a previous edition of the EPR Newsletter (v. 3, #3, Fall, 1991). **The contest is still open!** Contest entries should be sent to the Eatons at the University of Denver, Denver, CO, 80208, USA. Of course, we all like to have the newest and best instrumentation, but it will be interesting to find out just how much durability and staying power commercial EPR equipment can have. A current weak-pitch S/N test spectrum and a list of the spectrometer modules (or complete description of the spectrometer system) used to obtain the spectrum, must be submitted as proof that the spectrometer is still functioning. To establish instrument age please indicate the date of purchase and give the serial number for the console. A word to the wise — so far, the earliest documented delivery date is August, 1958. Can anyone beat that?

**CORPORATE MEMBERSHIPS:** Corporate members are welcome to the Society. There are four classes of corporate membership carrying different fees and privileges, as described in the EPR Newsletter, Vol. 2 #3, October, 1990, p. 7). Currently, there are ten corporate members; see their display boxes in the EPR Newsletter.

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For information on products and to determine the sales and service representative for your country, contact Dr. Dieter Schmalbein, Bruker Analytische Messtechnik, Division IX-EPR, D-7512 Rheinstetten-4-Fo. am Silberstreifen, Germany. Telephone: 49 721 5161 141; FAX: 49 721 5161 237.

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## FROM THE EDITOR

**To our readers:** As I will continue to remind you, you are needed to contribute material of interest to others in the EPR community. My editorial in the preceding issue (Winter, 1991) lists some appropriate kinds of contributions. We particularly urge you to provide timely information on meetings to be held and on recently or soon-to-be published books or conference proceedings pertaining to EPR. Brief reports of recent meetings are also welcome. To be assured of consideration for the Summer issue, material to be published (articles, letters to the editor, ads, notices, etc.; see the Editorial in the previous issue v.3,#4) should arrive by the beginning of June, and similarly for the other issues at 3 month intervals. Copy arriving later may be published immediately but is more likely to be held for the subsequent issue. Important: please indicate whether the material (ads, notices, etc.) ought to run in more than one issue, and notify us promptly when a notice or ad should be discontinued. In the absence of such indication, ads and some notices are repeated automatically in one or more subsequent issues, space permitting. It is helpful if paper copy is accompanied by text and graphics (for example, .PCX or .TIF files) submitted on IBM-compatible computer diskette or transmitted by E-mail. Submission of material implies permission to edit or modify it for publication. Normally, proofs are not sent.

R. Linn Belford

## LETTERS TO THE EDITOR

Sir:

I read with historical interest and personal enjoyment "What is the Signal/Noise of an EPR Spectrometer" by Gareth and Sandra Eaton. These authors invite "comments rebutting or refining these suggestions." I have a question. Who has investigated the stability of the "weak pitch" sample in a sealed container? Does the number of spins remain constant for over 35 years? I assume this would be approximately the age of the oldest weak pitch sample if first offered by Varian when commercial EPR spectrometers became available. Can anyone prepare a standard weak pitch sample (0.0035% pitch in KCl) or does the stability of the spin in the pitch used depend on origin? What is "reagent-grade" or "spectroscopic-grade" pitch anyway? It would seem more satisfying if the actual number of spins in weak pitch could be checked against a chemically established standard. If this is not possible,

then should S/N with three significant figures be reported (?) see "S/N of 450:1 on a similar weak pitch sample."

It seems to me that citing signal-to-noise ratios for spectrometers should not be taken too seriously. Since no absolute standards exist, this measurement should be taken with a grain of salt like horse-power ratings of performance engines (at what rpm?) or Olympic records (with or without chemical testing?).

E.G. Janzen, Director, MRI Facility &  
Professor, Clinical Studies & Biomedical Sciences  
University of Guelph  
Guelph, Ontario, CANADA

Sir:

Breach of the normal function of the stomach (ST) is a spread pathology of the organism. Despite a lot of publications, many of the principal issues are not clear. In our laboratory, we have been intensively investigating the gastric juice (GJ) using ESR to measure paramagnetic centers (PMC's). The GJ is a complicated colloid system. It participates both in digesting food and defending the surface of the ST. Its pH varies from alkaline to acid. Therefore, oxidation-reduction equilibria shift and may lead to formation of PMC's such as Hem-NO, which we observe as a structured ESR signal. We should be glad to provide a summary of this study to anyone interested and to exchange information with those who may be working on the application of ESR to this interesting and important medical problem.

Rafik G. Sayfutdinov  
Medical Institute  
Clinic of Hospital Therapy  
Krasnogo Vosstania Street, 1  
Irkutsk, USSR, 664003.

Sir:

We wish to inform EPR Newsletter readers about a new method that we have developed for the ESR study of combustible mineral resources (such as coal, peat, and oil) under high gasostatic pressure (up to 150 atm). It was noticed that such parameters of the ESR spectra of coal as signal width and intensity, relaxation parameters of paramagnetic centers, proportions of the contribution of different paramagnetic centers to the entire observed spectrum were quite sensitive to pressure. Differences between low- and high-pressure spectra are more noticeable under conditions of strong microwave saturation and fast modulation passage of the resonance. Our studies

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of coal with a tendency to unexpected blowouts and self-ignition demonstrate that a reasonable estimation of blowout and fire danger can be obtained with the aid of this technique. We believe that ESR under high gasostatic pressure is much more informative than conventional techniques in studying thermodynamically non-equilibrium amorphous solids.

We are very much interested in establishing contacts in this area with investigators from different countries.

Leonid S. Lyubchenko, Alexander A. Dadali, and Mikhail L. Lyubchenko  
Institute of Chemical Physics, Russia Academy of Sciences, 117977 Moscow, 4 Kosygin str., RUSSIA

## TIPS & TECHNIQUES

**TECHNICAL NOTE from the Biotechnology Resource in Pulsed EPR Spectroscopy: Resonator Structures for Electron Spin Echo (ESE) and ESE ENDOR —**

As a matter of convenience, preliminary tests of the combined radiofrequency and microwave structures for electron spin echo ENDOR (ESE-ENDOR) in our laboratory have been made using the transmission cavity of Mims<sup>1</sup>. The advantages of this resonator are its large

filling factor, low Q, and relative ease of use with liquid helium immersion dewars. Its sole disadvantage, as far as I am concerned, is that the sample is poured (or stuffed) into a pair of gaps between the  $\lambda/2$  dipole and the brass housing. This arrangement makes changing samples (or resonant frequencies) somewhat cumbersome, therefore we would like to make a resonator for ESE-ENDOR that accommodates samples in a standard 4mm EPR tube. Several examples have appeared in the literature<sup>2-5</sup>, and this note offers a few ideas to supplement the existing published designs.

Users of the Bruker ENDOR accessory for the ER and ESP spectrometer series are already familiar with the cylindrical  $TM_{110}$  cavity that is outfitted with an axial silver wire coil as the rf structure (*cf.* Biehl *et al.*<sup>6</sup>). A previous note in this newsletter<sup>7</sup> included a suggestion that this same cavity can be used for ESE-ENDOR, and trials in this laboratory indicate that this is a possible option. With short microwave pulses, however, one would want to lower the cavity Q to about 300, and I was able to achieve this by changing the heat shrink tubing that I use to manufacture my free-standing coils (*cf.* Hurst *et al.*<sup>8</sup>). Normally one should use a low dielectric kynar or teflon heat shrink; for the ESE-ENDOR coil I used a higher dielectric kynar. One can also drastically lower the Q of a  $TM_{110}$  ENDOR cavity by allowing the brass metal collars to encroach into the cavity or, oddly enough, by winding the coil in a left-handed helical fashion (I haven't worked out the field theory that is necessary for an explanation, so take this as an accidental observation).

Since most of my work is done with frozen samples in a helium immersion dewar, I have not implemented the modified Bruker cavity on our spectrometer. What I have done instead is exploit a property of the cylindrical  $TM_{110}$  cavity for spin echo. As it turns out, this resonant mode is frequency independent of the cavity's axial length; the Q, however, decreases with the axial length (see the MIT

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305 East Locust, Bloomington, IL 61701 USA (309) 829-9257

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Rad Lab books<sup>9</sup>). Therefore my ENDOR cavity prototypes are shortened  $TM_{110}$ 's (prototype lengths are 0.5", 0.75", and 1.0"), and these are now being tested by coupling with a coaxial line. The coil is mounted onto a centrally located quartz or rexolite tube; I use a higher gauge silver wire due to the now restricted cavity length. See Figure 1.

In principle, I expect two advantages beyond the lowered Q as a result of this  $TM_{110}$  modification. The compact design should feature a greater sensitivity due to a greater filling factor. Ordinarily, with frozen samples I use a 4mm EPR tube that is filled so that the sample occupies a volume that is about 1 cm in height. With a flow cryostat this diminishes problems that arise due to temperature gradients across the sample volume, and, in

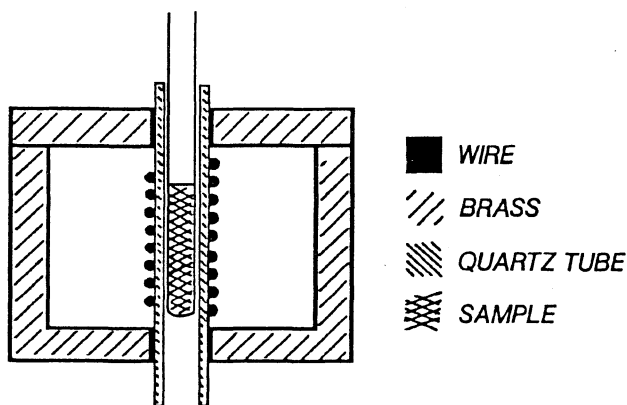


Figure 1. Cross-sectional side view of a cylindrical  $TM_{110}$  cavity prototype for ESE-ENDOR. Coupling to transmission line is *via* a coaxial line fed in through the cover piece.

general, this is a convenient volume (150-200  $\mu$ l) for biological or precious samples. In the cw-ENDOR cavity one needs the elongated axial length (ca. 4 cm) in order to ensure a high Q, so with the frozen samples there is about 3 cm of unused cavity along the resonant microwave field (recall that the original application of this

cavity was for solution ENDOR studies<sup>6</sup>), hence a poorer filling factor than when operating with solutions. With the shortened ESE-ENDOR version, this malady is magically 'cured'.

The other expected boon from the shortened design is an enhanced rf field for a given power input. The coils are likewise forced to be more compact, and based on simple finger-physics calculations, I predict a larger field/current ratio.

Although I have yet to try it, the shortened  $TM_{110}$  can be mated with flow cryostat systems such as the Oxford units because the diameter of the cavity has not been altered relative to that of the conventional 8-9 GHz cavity. In other words, you can still run a 1 cm o.d. quartz tube though the cavity and proceed as normal once you have allowed for the shortened axial length. I am hoping to ultimately use this feature to free myself of the helium immersion system that we currently use.

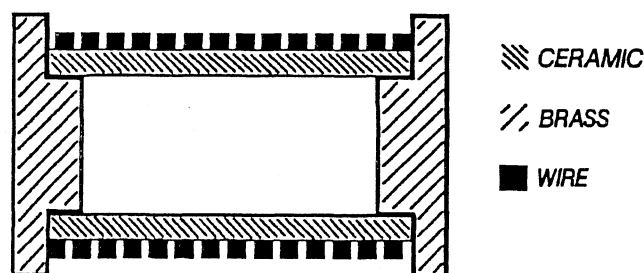


Figure 2. Cross-sectional side view of cylindrical  $TE_{011}$  cavity formed by wrapping insulated magnet wire around a ceramic wall. Spacing between turns exaggerated for clarity.

Also popular in cw-ENDOR studies is the cylindrical  $TE_{011}$  cavity. This is an inherently high Q structure (published designs have Q's as high as 15000) and feature rf coils that are either parallel posts or part of a wound-wire cavity wall (see Poole's treatise<sup>10</sup>). The Q of these cavities is prohibitively high unless one makes an effort to lower it. I borrowed an idea from a published design of Sloop<sup>4</sup> and wound the wire that serves as microwave shield and ENDOR coil around an  $Al_2O_3$  ceramic tube (high purity, from Goodfellow) or a cylinder fabricated from a plastic called Vespel that is stable to temperature extremes (AIN Plastic). I fashion brass end plates for the given material and 'glue' the thing together using GE-7031 varnish (Figure 2); the magnet wire that I use has a square cross section, which makes winding these structures easier (available from MWS Industries). In the prototype shown in Figure 2, coupling is similar to that used for the  $TM_{110}$ , and the leads that penetrate the brass end plate are hooked up to the rf circuit for testing. The dielectric material reduces the dimensions of the cavity

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that is required to achieve a resonant frequency of 8-9 GHz and spoils the Q; the smaller outside diameter means the wall/rf coil is more compact and more efficient for reasons similar to those cited above.

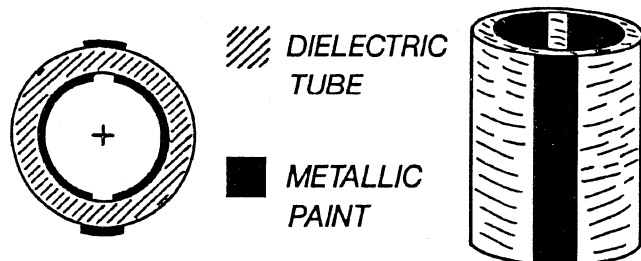


Figure 3. The bridged loop-gap resonator (after Pfenninger *et al.*<sup>11</sup>).

A third design is based on Schweiger's bridged loop-gap resonator<sup>5,11</sup>. This little gem has all the properties one would ever desire for ESE and ESE-ENDOR: low Q, ease of access, tunability. Unfortunately, I couldn't leave well enough alone and began to play with the idea of using various dielectrics to extend the BLGRs' tuning range (we strive for tunability between 6 and 18 GHz with our spin echo spectrometer).

In the original design, the BLGR is fashioned from a quartz cylinder onto which is painted the loop gap and 'bridge' (Figure 3). The quartz is a factor in the capacitance between the gap and the bridge, and one can tune over a limited range by varying the thickness of the quartz tube. There are limits to how much one can tune the BLGR by varying the tube's thickness, so variation of the capacitance by other means is desirable. As it turns out, there is a new microwave material called TMM (Rogers Corp.) that can be manufactured with variable dielectric properties depending on its formulation, and I have made a couple of prototype tubes out of this material for BLGR fabrication. The stuff is reasonably machineable and so far has taken silver paint well and survived sundry 'torture tests'. Like the other designs discussed here, on the bench the modified BLGR has performed in a manner that suggests useful applications for spin echo experiments.

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Chris Bender, Biotechnology Resource in Pulsed EPR  
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#### TIP: Cleaning Method to Remove EPR Cavity Background Signals —

Maintaining an EPR cavity background-free seems to be an impossible job. Removing the material which causes the background signal can take up a lot of time and sometimes is not very successful, while damage to the cavity may occur if the cleaning process is not done carefully enough.

We have found a commercially-available silver stain remover to be very effective in removing background signals in silver-coated cavities. The product we have used is called "TARN-X" and is distributed by Jelmar, 6600 N. Lincoln Ave., Lincolnwood, IL, USA. Gently rubbing the interior walls with a cotton swab moistened with TARN-X removes, within minutes, all silver tarnish stains and with them contamination trapped in the stains. The cavity then can be rinsed clean.

Cautions: Probably there are similar and equally effective silver cleaners on the market. However, they must be tested to insure that, like TARN-X, they are "EPR-silent" and do not contain any abrasive polisher. It is best to use silver cleaner sparingly to minimize the chances of damage to the silver surface and to try not to let it seep into the joints between cavity walls.

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and

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## TECHNICAL NOTE from the Biotechnology Resource in Pulsed EPR Spectroscopy: An Interface Between a Source-Locking Frequency Counter and YIG Oscillator -

One of the features that we have desired to incorporate into our pulsed EPR spectrometer is a wide range of operating frequencies. We have been achieving our broadband capability by using a separate microwave source for each band desired. Our sources, therefore, consist of a battery of klystrons that are controlled from a Hewlett-Packard power supply and a FEL phase lock synchronizer.

In principle, the multiple klystron configuration may be replaced by a single YIG oscillator, which is a voltage controlled tunable device. One of the reasons that YIGs have been shunned in the past is that their frequency stability is achieved only with considerable effort and often still is not favorably comparable to that of a klystron. Avantek and Microsource, however, have recently marketed YIG oscillators whose frequency stability are comparable to the klystron system described above, and, together with a source locking frequency meter, constitute a microwave source for our pulsed spectrometer that is competitive with klystrons. Our goal is to replace the klystrons with a single YIG oscillator that is controlled by a programmable source-locking counter.

We opted to build our prototype around the Avantek 78012 YIG oscillator and the EIP 575B counter. The latter is rather expensive at \$12K, but can now be found on the used equipment market for about \$3K, which is the only way this system becomes cost effective (the YIG cost us about \$1800). This particular counter provides two voltage outputs for source control; it has been designed to control sweep generators such as the Wiltron 6600. The two source controls consist of a coarse adjustment control that converts a keypad assigned frequency into a voltage and an error voltage for phase control (fine tune). For a given 'band' on the frequency counter, the coarse control output specifies a positive voltage (up to about 10V range)

in order to get within 5 MHz of the programmed frequency. The fine tune output is bipolar and supplies an error correction to the source until it matches the frequency programmed into the counter.

Avantek specifies an SSB phase noise of  $-105\text{dBc/Hz}$  at 20 kHz off carrier for the model 78012 oscillator. The unit has two inputs for frequency control: a coarse setting and an FM or phase control. The tuning is current controlled; the Avantek data book outlines a basic driver circuit for the control of the YIG that utilizes a D/A converter and a voltage-to-current converter. The final stage of the EIP coarse tune circuit consists of a D/A converter, therefore we based our interface design on the recommended circuit that appears in the Avantek data book.

The EIP phase control output was compatible with the Avantek FM input without any modification since its final stage features a satisfactory driver. Interfacing the coarse frequency control involved a design that solved two problems. The first design consideration was that we supply the necessary voltage-to-current transformer required by the YIG control hardware. This was achieved by ICs and an amplifier stage that consisted of a Darlington transistor. The second problem involved the proper alignment of the EIP's voltage output so that it coincides with the range of the YIG. For this latter design consideration we used a series of op amp circuits offset by an adjustable reference voltage to provide alignment between the EIP output and the YIG input.

The reference voltage is set by using the simple divider circuit of Figure 1. The alignment and supply voltages are rather arbitrary, so the resistor values and diode will vary according to users requirements. For our application, however, we required an alignment (i.e. reference) voltage of about 3.4V, which we achieved by first dropping the +15 V from the power supply to 7.0 V using a 5.6 K resistor. The alignment

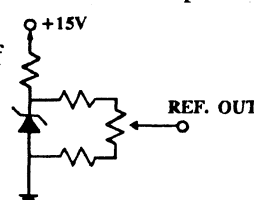


Figure 1

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voltage was then fine tuned using the additional resistors (3.3K) and trimpot. The Zener diode is a 1N3830, which is rated at 7.5V and 1W. A trimpot is not absolutely necessary, but it does provide a convenient means of 'fine tuning' and allows for accommodating other YIG models. In our prototype described here the YIG is only tunable over a 8-12.4 GHz range, whereas the EIP delivers an output voltage from the D/A converter that will span a frequency range of 1-20 GHz (this frequency range constitutes one 'band' on the counter). The alignment voltage obtained from this divider is used in the driver circuit that is depicted in Figure 2.

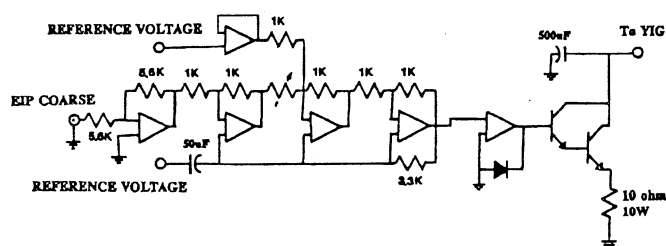


Figure 2. Driver circuit for coarse tune.

The driver circuit for the EIP/YIG interface (Figure 2) utilizes BIFET op amps (LF353s) and a Darlington NPN transistor (TIP120). Unless otherwise indicated, 1/4W resistors are used throughout. The diode is a 1N914 and the electrolytic capacitors are rated at 50V, although the voltage rating of the latter is primarily due to what capacitors we had in stock.

We built our prototype with the YIG mounted onto a 6 x 4 x 1/4" aluminum plate. The perfboard containing the driver circuit and terminals for power supply hookup were also mounted on this plate, which is an adequate arrangement for testing purposes (in practice, the YIG should be well shielded). The output of the YIG and its feedback circuit was passed directly to an HP spectrum analyzer (cf. Figure 3), with which we made our phase noise measurements and verified the specifications claimed by Avantek.

In principle, the EIP counter can be used to control other microwave sources. Other YIG oscillators can be used with the circuit described above. For example, Avantek markets a model 76318 that spans a 6-18 GHz frequency range (one can also obtain some of these models with an integrated driver). Klystrons can also be interfaced, albeit with a fair amount of difficulty. Among the problems associated with the design of an interface for the latter are the higher voltages required to drive the reflector and getting the response time of the feedback

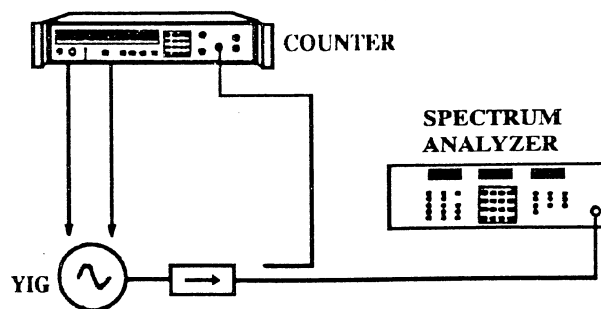


Figure 3. Test Set-up.

loop low enough that the error voltage control is meaningful. We were at one point working on this with the help of an engineer from EIP, but this has fallen by the wayside due to other priorities.

Submitted by:

Chris Bender & Subhash Gedam  
Biotechnology Resource in Pulsed EPR  
Einstein College of Medicine  
Bronx, NY 10461, USA

## NEWS FROM EPR CENTERS

*FROM the NATIONAL BIOMEDICAL ESR CENTER in Milwaukee:*

**TRAINING AWARDS** — As described more extensively in the previous issue (EPR Newsletter, v.3#4, Winter, 1991, p. 10), five to ten awards of \$500 are available to pre- and post-doctoral young investigators to help expenses to visit the Center in Milwaukee for a two-week period during 1992. The purposes are to provide training in modern EPR methods and to permit the investigators to use the unique facilities of the Center in their on-going research. The faculty and staff of the Center have expertise in the three main areas of EPR research: free radicals, spin labels and transition metals. To apply, send a letter and one-page research plan; student applications should be accompanied by a letter from the graduate faculty advisor. Address applications to Dr. Ching-San Lai, National Biomedical ESR Center, Medical College of Wisconsin, 8701 Watertown Plank Road, Milwaukee, WI 53226, USA; ☎: 414-266-4051.

**SUMSPEC92 released** - The Center has released the computer program SUMSPEC92, replacing SUMSPEC90. This post-acquisition spectral processing program will be distributed free of charge, one copy per laboratory, to interested persons. The program was written on and for



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IBM or IBM clone PC's with an EGA or better display system. Available disk formats are 5-1/4" (360 kb or 1.2 Mb), 3.5" (720 kb or 1.44 Mb). For more information, see the previous issue (EPR Newsletter, v.3#4, Winter, 1991, p. 10). Address requests to: Dr. James S. Hyde, National Biomedical ESR Center, Medical College of Wisconsin, 8701 Watertown Plank Road, Milwaukee, WI 53226, USA.

## *FROM the ILLINOIS EPR RESEARCH CENTER (IERC) in Urbana:*

**TRAINING AWARDS** — We hope to have funding during 1992-3 for a few awards in a traineeship program similar to that offered by the Milwaukee center (see above). Preferably, trainees would take advantage of special facilities or expertise (multifrequency EPR, L- to W-band; S-band pulsed EPR; EPR *in vivo*; EPR imaging; metalloprotein EPR; ENDOR) available at the IERC. Direct inquiries to the Illinois EPR Research Center c/o Becky Gallivan, Univ. of Illinois, 190MSB/MC-714, 506 S. Mathews Ave., Urbana, IL 61801; ☎: 217-244-1186; FAX: 217-333-8868.

## *FROM the BIOTECHNOLOGY RESOURCE IN PULSED EPR SPECTROSCOPY (BRPES) in New York:*

**INSTRUMENTATION DEVELOPMENT** — Chris Bender is working on technical improvements for pulsed EPR spectroscopy (including ENDOR) at this Research Resource. The "Tips and Techniques" section (this issue) contains technical notes on two aspects of this development. He will continue informing us as development proceeds.

## *FROM the NATIONAL BIOMEDICAL CENTER FOR SPIN TRAPPING & FREE RADICALS, Oklahoma City:*

**FOR USERS:** You may direct inquiries to Mrs. Audrey Winkles by FAX: 405-271-3980.

Edward G. Janzen, Director

## COMPANY PROFILES

These profiles introduce readers to some of the Corporate Members of the International EPR Society.

### CRC PRESS, INC.

**FROM 1900 TO 1973: The genesis of a publishing company** — The origin of CRC Press can be traced back to the year 1900 in Cleveland, Ohio, when a young man, Arthur Friedman, attending Case School of Applied Science started a part-time enterprise to produce and sell rubberized

chemistry aprons. Within a few years, Arthur was joined by his brothers Leo and Emanuel, and the operation became the Chemical Rubber Company, expanding its product line to include other laboratory items such as rubber stoppers and tubing.

In 1913, the Chemical Rubber Company published the first edition of the world-famous Handbook of Chemistry and Physics. It soon became the basic reference book for all students of chemistry and physics throughout the western world. Known as the CRC Handbook or "Rubber Bible", a new edition has been published annually, with the exception of the years during the First and Second World Wars. The 72nd Edition published in 1991 contains almost 2500 pages of the most useful and up-to-date information in the physical sciences.

In the early 1960's, Florence and Bernard Starkoff acquired 100% ownership and the Company moved simultaneously in two new directions. First it developed and manufactured a proprietary product line of scientific equipment; and second, it undertook the publication of several new handbooks in other scientific subjects.

Both operations grew so rapidly that it became necessary to choose between the two. In 1973, the manufacturing division and related activities were sold, and the company began to concentrate exclusively on publishing. To mark this event, its name was changed to CRC Press, Inc.

**FROM 1974 TO 1991: Years of rapid growth** — In little over a decade, CRC Press has not only joined the ranks of major publishers, but is generally recognized as the leading publisher of professional-level reference books in science and engineering. In 1979, nearly 60 new volumes; in 1980, 75 new volumes were published; in 1981, 130 new volumes; and in 1982, over 150 new volumes. In 1991, the Company will publish almost 400 volumes. In addition to books, CRC Press also publishes 25 journals whose subscribers are major reference libraries throughout the world including Eastern Europe and most of the newly developing countries of Africa and Asia. These journals carry no advertising, and the articles are written by outstanding experts and specialists in their respective fields, including several Nobel Prize winners. At the present time, CRC is receiving manuscripts from scientists located in every part of the globe at a rate of over 100,000 pages per year.

The CRC list of reference books numbers over 900 titles, most of which are still current and useful and some have already become scientific classics. Today, CRC books and journals are on the shelves of private and public libraries in virtually every country throughout the world.

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The Company employees approximately 200 full-time personnel, plus approximately 100 free-lance personnel which it has trained for specialized tasks such as key-boarding, copy-editing, proof reading, and page layout.

In 1986, CRC became a subsidiary of the Times Mirror Corporation. This change served as a prelude to further rapid and significant growth.

For further information call:

**CRC Press, Inc.**

2000 Corporate Blvd., N.W.

Boca Raton, FL 33431, USA

☎: 407-994-0555; Telex: 568689; Fax: 407-997-0949

## SUMITOMO SPECIAL METALS CO., LTD.

Sumitomo Special Metals Co., Ltd. (SSMC) has had more than 70 years' experience giving customers applications on the cutting edge of technology, using Alnico, Ceramic(Ferrite), Sm-Co and Nd-Fe-B(NEOMAX).

NEOMAX, our trade name for Nd-Fe-B, was first developed in 1983 by SSMC R & D engineers and is the most powerful permanent magnet in the world.

Using accumulated NEOMAX technology and computer-aided magnetic design technology, SSMC developed the magnetic assembly system for MRI (Magnetic Resonance Imaging) with field homogeneity of about 30 ppm.

In 1989 SSMC developed an innovative portable EPR Spectrometer (Trade name: SPIN-X) under the direction of Prof. M. Ikeya, Osaka University, Japan.

SPIN-X is very compact (4.4 lbs.) and has a reasonable sensitivity of  $1 \times 10^{15}$  (spins/Oe) and is useful for an educational apparatus for students in universities.

Also, newly developed EPR spectrometer "SPIN-XX" with an improved sensitivity of  $5 \times 10^{12}$  (spins/Oe) is available and has the following applications:

- 1) Fundamental experiments in physics and chemistry
- 2) Development of ceramics and high polymerized compounds
- 3) Detecting of radiation damage
- 4) Dating of fossils and minerals

For more information, contact:

**SUMITOMO SPECIAL METALS AMERICA, INC.**

23326 Hawthorne Blvd., #360

Torrance, CA 90505

Attn: Dr. Hitoshi Yamamoto, Manager, Engineering

To contact company headquarters in Japan, see the Sumitomo display box in the EPR Newsletter.

## MICRO-NOW

Micro-Now was founded in 1962 by Clarence Arnow to provide unique microwave instrumentation for researchers working in such areas as ESR, microwave spectroscopy, plasma research, aerospace and similar specialized fields.

Though originally Micro-Now provided only ESR system components for researchers who were building their own systems or who wished to upgrade an existing system, when Varian discontinued their E4, 104 series, Micro-Now stepped into the breach with its own line of ESR spectrometers.

The Model 8300A computer-controlled X-Band ESR system is Micro-Now's premier spectrometer. It combines high performance and moderate cost in an easy to use system that can be used either stand-alone or under the control of an external computer/data processor. Individual components of the 8300A are available separately for upgrading or modifying existing spectrometers.

The Model 8100 is a complete stand-alone ESR system designed for teaching laboratories on a limited budget. Though not as sensitive or versatile as the Model 8300A, its performance is more than adequate to permit its use in both educational and less demanding research environments. In addition, the Model 8100 is capable of upgrading to near 8300A standards by replacement of various system components.

Micro-Now's newest ESR spectrometer is the Model 8200, which uses a permanent magnet instead of an electromagnet to provide performance comparable to the Model 8100 in a simpler, more compact package.

For complete information on Micro-Now's line of ESR spectrometers, ESR system components, or other microwave instrumentation, contact:

Clarence Arnow

Micro-Now Instruments Co., Inc.

8260 N. Elmwood Street

Skokie, Illinois 60076 USA

Telephone: (708) 677-4700

Fax: (708) 677-0394

## JEOL

JEOL is one of the leading world-wide manufacturers of ultrahigh sensitivity ESR spectrometers. To meet the user's expanding needs, JEOL offers the JES-RE Series of ESR Spectrometers. This series employs newly developed high sensitivity cylindrical-type cavities with a high Q

value and time-proven oscillators (special Gunn diodes) to give higher accuracy and reliability. These easy-to-use instruments greatly aid in applications ranging from basic research of solid state physics to specific measurements in the materials development field and the biological field.

The JES-RE Series also has a wide variety of attachments available (including Q-band and L-band units, digital variable temperature systems, ENDOR spectrometers, etc.) to effectively support research and development in accordance with diversified research purposes. Also, use of the ESPRIT 330 (UNIX-based 32-bit HP engineering workstation) allows on-line control of the entire spectrometer system as well as giving higher-order data processing. In the USA, for additional information on how the JES-RE Series can improve your analyses, please do not hesitate to contact our headquarters in Peabody, MA at 508/535-5900. In other countries, contact the company headquarters — JEOL, Ltd., Akishima, JAPAN, at telephone (0425) 42-2187 or FAX (0425) 46-5757 for product information and for the name and address of your nearest JEOL representative.

## CONFERENCE REPORT

### Notes from 3rd International Symposium on Spin Trapping and Aminoxyl Radical Chemistry

This symposium was held at the Kyoto International Conference Center, Kyoto, Japan, between November 22-24, 1991. The meeting was organized by Drs. Keisuke Makino (President), Edward G. Janzen (Vice-President), and Toshikazu Yoshikawa (Treasurer). The scientific program consisted of three sessions: spin labels and spin labeling; theoretical and basic chemistry of spin trapping; and the application of spin trapping in chemistry and biochemistry. There were 32 oral presentations and 49 poster presentations.

Dr. Hideg (University of Pecs, Hungary) elucidated the methodology of site-specific spin-labeling of biomolecules. Dr. Zhdanov (Moscow) discussed the possibilities of spin labeling membrane-bound enzymes and the use of spin labeled inhibitors to probe active site(s) of cholinesterases. Dr. Tsuda and co-workers reported alterations in the fluidity of erythrocytes and vascular smooth muscle cells isolated from hypertensive rats using ESR. The abnormality in membrane fluidity of spontaneously hypertensive rats was exacerbated by calcium and prevented by calcium-antagonists. Dr. Tordo (Marseilles, France) described an exciting array of a new class of phosphorylated nitroxides. These studies will lead to an improved understanding of the influence of molecular conformation upon the ESR parameters of stable nitroxides and is crucial to interpreting ESR spectra of spin adducts.

Dr. Gary Buettner (University of Iowa, Iowa City, U.S.A.) described the pitfalls and subtleties relating to the basic chemistry of spin trapping as they pertain to trapping of superoxide radicals by 5,5-dimethyl-1-pyrroline N oxide (DMPO). Using a photochemical system (riboflavin and visible light in the presence of oxygen) to generate superoxide, he failed to find evidence to support DMPO-OH formation from DMPO-OOH. He stressed that decomposition of DMPO-superoxide adduct (DMPO-OOH) to DMPO-hydroxyl adduct (DMPO-OH) is primarily catalyzed by the redox-active metals or peroxidases. The bottom line of his presentation was that the common notion that DMPO-OOH spontaneously degrades to DMPO-OH is a misconception.

Dr. Colin Chignell (NIEHS, North Carolina, USA) presented exhaustive data on spin trapping of superoxide by DMPO in aprotic solvents. One of the limitations of trapping of oxy-radicals by DMPO is that the ESR spectrum of the DMPO-superoxide adduct is virtually indistinguishable from that of the DMPO-peroxyl adduct (DMPO-OOR). In aqueous solutions, these can, however, be differentiated by the use of superoxide dismutase. However, in nonaqueous systems, such differentiation is not possible. As a result, there were several inconsistencies in the reported ESR parameters for DMPO-oxy radical adducts in nonaqueous solvents. Dr. Chignell and co-workers have now obtained accurate ESR parameters of DMPO-OOH in aprotic solvents. Such data are crucial in ESR studies designed to probe Type I (radical-mediated) reactions during photodynamic activation of hydrophobic sensitizers in nonaqueous solvents.

Dr. DuBose (Oklahoma Medical Research Foundation) described a newer ESR data base that is being developed at the National Biomedical Center for Spin Trapping at Oklahoma City (NIH-supported Research Resource). This data base includes mass spectral information on spin adducts. Mass spectrometry is being used increasingly to identify and characterize unequivocally the structures of spin adducts. The Oklahoma data base is a valuable adjunct to the one already in existence at the NIEHS, Research Triangle Park, NC.

Dr. Yashige Kotake, also from the Oklahoma Spin Trapping Center, rationalized why the hydroxyl adduct of  $\alpha$ -phenyl *tert*-butyl nitron (PBN-OH) is so unstable in aqueous solutions at physiological pHs (pH ~7.5). Unlike DMPO-OH, the PBN-OH decays via an ionic mechanism to benzaldehyde and *tert*-butyl hydroaminoxyl. This decay process is strongly dependent on the pH of the medium, i.e., the half-life of PBN-OH is 80 seconds at pH 6.0 and 11 seconds at pH 8.0. Such kinetic information may provide a new insight into the trapping of oxy-radicals by PBN in various heart models of myocardial ischemia and reperfusion.

Dr. Edward Janzen, Director of the Spin Trapping Center at Oklahoma, expanding on the same theme, reported that the hydroxyl adducts of PBN substituted with electron-donating groups (i.e., methoxyl group) are less stable than the hydroxyl adducts of PBN substituted with electron-withdrawing

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group (i.e.,  $-\text{NO}_2$ ,  $-\text{SO}_3^-$ , etc.). These studies are designed to develop the ideal trap for detecting the hydroxyl radical formed in both the intra- and the extracellular milieu. It should, however, be stressed that the toxicity of spin traps is the ultimate deciding factor when it comes to selecting spin traps for use in myocardial research. Dr. Janzen has also emphasized that mass spectrometry will play a major role in future spin trapping studies, especially with regard to determining structures of spin adducts formed from trapping of radicals derived from endogenous biological substances (lipid, etc.).

Because of the potential limitations of detecting directly the hydroxyl radical formed under *in vivo* conditions, Dr. Ronald Mason (NIEHS, North Carolina, U.S.A.) and coworkers employed a novel double-trapping technique in which the hydroxyl radical reacts with dimethylsulfoxide (DMSO) to form methyl radical which is then detected as the PBN- $\text{CH}_3$  adduct. He also elaborated on use of isotopically labelled radical scavengers ( $^{13}\text{C}$ -substituted DMSO, etc.) to fully corroborate the structures of spin adducts.

Drs. Peter Riesz (NCI, Maryland, U.S.A.) and Takashi Kondo (Fukui Medical School, Japan) described the chemical and biological effects of ultrasound. Hydroxyl radicals and hydrogen atoms produced during sonochemical processes were detected by spin trapping. Dr. Tomasi (Modena, Italy) and co-workers discussed the free radical metabolism of *tert*-butyl hydroperoxide and the modulating effects of antioxidants as detected by ESR-spin trapping. Methyl radicals have been shown to be formed via the enzymatic one-electron reductive metabolism of *tert*-butyl hydroperoxide.

There were three presentations on the application of spin trapping to investigate production of endothelial-derived relaxing factor (EDRF) and related radical species. There is increasing evidence that the chemical identity of EDRF is synonymous with nitric oxide (NO) or NO-like species. It is now established that NO reacts with superoxide to form an unstable peroxynitrite (ONOOH) which then decomposes to OH and  $\text{NO}_2$ . To date, there is, however, no definitive evidence for the occurrence of this reaction in biological systems. Dr. Alasdair Carmichael (AFRRI, Maryland, U.S.A.) described the use of DMPO to detect radicals formed under these conditions. The chemistry of the reaction between DMPO and  $\text{NO}_2/\text{NO}$  is clearly very complicated. Dr. Carmichael emphasized that much needs to be learned about the chemical reaction mechanisms before they can be applied to biological studies.

Dr. Ichimori (Tokyo University, Japan), working in collaboration with Dr. Nakazawa, discussed the use of spin trap dibromonitrosobenzensulfonic acid (DBNBS) to detect NO produced in human platelets. DBNBS appears to trap NO, but the resulting adduct is unstable and decomposes to another nitroxide. The investigators are currently working on model systems to understand the decomposition pathways of [DBNBS NO] complex. Again, a detailed understanding of

the chemistry of NO reaction with spin traps is clearly essential.

Dr. Carmen Arroyo (VA Medical Center, Baltimore, U.S.A.) reported the detection of a receptor-mediated generation of an EDRF-like radical in mouse neuroblastoma cells using the spin trap DBNBS. DBNBS caused a dose-dependent inhibition in the activity of guanylate cyclase induced by L-arginine, thus implicating trapping of NO or NO-derived radical. However, the structures of NO-derived radical adducts from DBNBS are not exactly known. Trapping of NO by endogenous and exogenous probes and spin traps is an area that undoubtedly deserves more attention.

Dr. Harold Swartz (University of Illinois, Urbana, U.S.A.) recapitulated the importance of measurement of oxygen concentration in tissues and cells in relation to the metabolism of spin traps and spin adducts. Dr. Swartz described the use of cellular oximetry by ESR. Of particular significance, is the application of a new class of chemical compounds (e.g., lithium phthalocyanine) which can be used to measure oxygen concentration in cellular and organ systems. The ESR linewidth of lithium phthalocyanine is exquisitely sensitive to very low concentrations of oxygen. This newer technique appears to have definite advantages over conventional spin label oximetry in some respects (sensitivity, lack of spin probe reduction, etc.). Dr. Swartz presented data on oxygen consumption in isolated heart models using this probe.

Dr. Walee Chamulitrat (NIEHS, North Carolina, U.S.A.), reported evidence for the reductive inhibition of lipoxygenase enzyme by drugs that are metabolized to free radicals. These drugs contain the hydroxamate group. The proposed mechanism of inactivation of lipoxygenase by these drugs involves reduction of the catalytically active ferric form of the enzyme to its ferrous form. Direct ESR may be therefore used to screen compounds that can inactivate lipoxygenase by the above mechanism.

Dr. John Carney (University of Kentucky, Lexington, U.S.A.), collaborating with Dr. Robert Floyd, summarized the biological applications of spin-trapping compounds. Of dramatic significance is the finding that daily administration of the spin trap PBN to old gerbils reversed the aging process. In other words, spin trap administration increased neuronal protease activity, thereby increasing the catabolism of oxidized protein. Spin trapping thus validates the long-standing hypothesis linking free radicals to the aging process.

Dr. William Pryor (Louisiana State University, Baton Rouge, U.S.A.), reviewed the chemistry and biochemistry of the reactions of ozone. Ozone is the number one environmental pollutant in industrialized countries according to the World Health Organization. Dr. Pryor clearly illustrated that ozone reacts with polyunsaturated fatty acids forming lipid peroxides, aldehydes, and hydrogen peroxide. ESR spin trapping was also used to detect the intermediate lipid-derived radicals.

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Dr. Michael Davies (University of York, U.K.), described the use of spin trapping with DMPO to obtain information about the site(s) of radical damage in proteins. Immobilized ESR spectra were obtained from trapping of protein-associated radicals. Selective blocking of exposed cysteine residues completely abolished the ESR spectra in some cases. Protein oxidation is a key molecular event that is linked to several pathological processes including atherosclerosis. Future studies in this direction will undoubtedly make use of the site-directed mutagenesis.

Dr. Lester Reinke (Oklahoma Medical Research Foundation, Oklahoma, U.S.A.) and co-workers, presented spin-trapping evidence for the production of superoxide and hydroxyl radical during microsomal oxidation of NADPH.

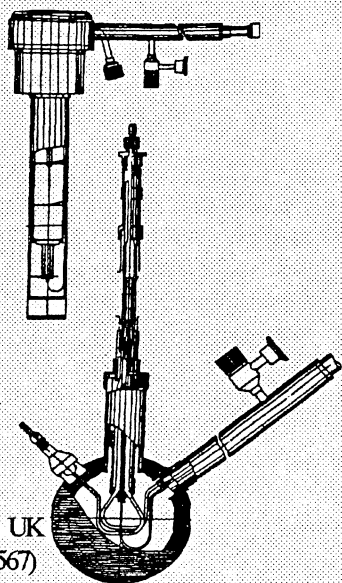
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They demonstrated that removal of catalase (by addition of azide or pretreatment of rats with aminothiazole) and superoxide dismutase (by column chromatography) was necessary to obtain the ESR spectra of DMPO-OOH and DMPO-OH. In the presence of ethanol, the ESR signal of the DMPO-hydroxyethyl adduct was observed. It was concluded that microsomes themselves were the source of the catalytic amounts of iron.

Dr. Pou (University of Maryland School of Pharmacy, Baltimore, U.S.A.), collaborating with Drs. Britigen, Cohen and Rosen, showed evidence for production of hydroxyl radical by activated neutrophils. They developed a sensitive spin-trapping system using the spin trap 4-pyridyl-1-oxide N-*tert*-butylnitron (4-POBN) in conjunction with ethanol to

detect hydroxyl radical as 4-POBN-CH(CH<sub>3</sub>)OH adduct. An interesting observation in their studies is that hydroxyl radical was not detected from myeloperoxidase-deficient neutrophils.

Drs. Kalyanaraman, Feix, and Towell (National Biomedical ESR Center, Milwaukee, U.S.A.), discussed the use of HPLC with electrochemical detection and ESR-spin trapping. They demonstrated that DMPO-derived radical adducts could be detected by HPLC-EC in picomolar concentrations. Again, the use of isotopically substituted radical scavengers was emphasized. HPLC-EC was also used to detect formation of singlet oxygen (<sup>1</sup>O<sub>2</sub>) by monitoring production of 2,5-dihydroxybenzoic acid (2,5-DHBN), which is formed as a sole product of <sup>1</sup>O<sub>2</sub> reaction with salicylic acid.

Drs. Moon Yim, Earl Stadtman, and coworkers (NIH, Bethesda, USA), discussed the finding that Cu-Zn SOD is capable of catalyzing formation of the hydroxyl radical and scavenger radicals while being inactivated by H<sub>2</sub>O<sub>2</sub>. They speculated that elevated intracellular SOD activity may cause more harmful effects to cells. Increased extracellular SOD levels has previously been shown to be deleterious to ischemic heart subjected to reperfusion. Well! This only goes to show that too much of a good thing is also not so good.

Dr. James Mitchell (NIH, Bethesda, U.S.A.), provided novel evidence for nitroxides as protectors against oxidative stress. Dr. Mitchell and co-workers have identified a set of stable nitroxides (five- and six-membered rings) that possess superoxide dismutase-like activity. These low-molecular-weight, cell-membrane-permeable nitroxides were shown to protect mammalian cells from oxy-radical induced cytotoxicity. They also demonstrated that nitroxides afford protection against ionizing radiation for both *in vitro* and *in vivo* systems. For example, the nitroxide TEMPONE was shown to inhibit "alopecia" in mice subjected to ionizing radiation, and this modality is currently being tested in the clinics. These findings clearly have implications for health care.

Dr. Kuwabara (Hokkaido University, Japan), illustrated a novel spin-trapping methodology for detection of precursors of hydroxyl radical-induced DNA damage. Precursor radicals derived from oligomers (oligo (dt) and oligo (dc)) were first trapped by means of 2-methyl-2-nitrosopropane (MNP). The resulting spin adducts exhibited broad, featureless ESR spectra (probably due to slow-tumbling of nitroxide spin adducts with a large molecular weight). However, following digestion of the spin adducts by phosphodiesterase, the ESR spectra became better resolved due to the release of small molecular weight nitroxide fragments. In this way, several radical adducts derived from trapping of sugar radicals (i.e., C4'- and C5'-sugar radicals) were identified and also separated by HPLC. Clearly, this approach is very promising in being able to identify site(s) of radical damage in large macromolecules.

The contents of the poster sessions were as interesting as they were diverse, with papers ranging from spin labeling in molecular biology to *in vivo* detection of spin labels in living

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animals, and the detection of free radicals during ischemia and reperfusion. Finally, this reviewer would like to congratulate both Drs. Makino and Yoshikawa for a memorable and successful meeting.

For those who missed this exciting and stimulating meeting, there will be another opportunity in two years to learn about the latest developments in our discipline—the next International Spin Trapping Symposium will take place in Oklahoma City, U.S.A. For information, contact Dr. Edward Janzen, National Biomedical Center for Spin Trapping and Free Radicals, 825 N.E. 13th Street, Oklahoma City, OK, 73104, U.S.A. Telephone: 405/271-6673.

Report provided by Balaraman Kalyaraman  
Biomedical ESR Center, Milwaukee, WI, USA

## BOOKS and PROCEEDINGS

### EMARDIS-91 ELECTRON MAGNETIC RESONANCE OF DISORDERED SYSTEMS.

*Proceedings of the Second International Workshop, Sofia, Bulgaria, 27-31 May 1991* edited by N D Yordanov (Bulgarian Acad. Sci.), published by World Scientific Publishing Co., Singapore. Place orders with the publisher (in Europe FAX 44-81-4463356; in USA and Canada call toll-free 1-800-227-7562; in other countries FAX 65-3825919). Catalog #981-02-0695-X. Price: US\$68; £39. About 400pp; Publication date: December, 1991.

This workshop aimed to cover all aspects of recent developments in theory, methodology, instrumentation, etc., of electron magnetic resonance (EPR, ENDOR, ESE) of disordered systems through lectures delivered by top experts and selected papers. According to the prepublication literature, the Proceedings contain the following:

Contents:  $^1\text{H}$  ENDOR Spectroscopy of Vanadium and Chromium Complexes in Solution (*M Branca*); Recent Advances in the Characterization of Paramagnetic Oxygen at Solid Surface (*M Che*); Longitudinal Detection of the ESE by Using a Pulsed and Low-Power Microwave Field (*A Collogiani*); Spin-Spin Interactions in Power Spectra of 2-mm EPR (*S Dikanov*); The Progress in EPR Imaging (*U Ewert*);  $^{27}\text{Al}$  ESEEM of Paramagnetic Cations in Zeolites (*D Goldfarb*); Applications of Pulsed EPR-Techniques (*P Hofer*); Electron Spin Polarization in Photosynthetic Reaction Centers Measured with Pulsed EPR (*A Hoff*); ESE and ENDOR Studies of Triplet State Cooper (II) Complex Dimers (*M Iwaizumi*); Electron Spin Echo Modulation Studies of Transition Metal Ions in Layered Clays and Aluminophosphate Molecular Sieves (*L Kevan*); Model Compounds of Photosynthesis - Synthesis and ENDOR Spectroscopy of Covalent Linked Porphyrin Quinones

(*H Kurreck*); Single-Crystal like Spectra from Disordered Systems as Obtained by High Field EPR (*Ya S Lebedev*); Micro EPR and its Development (*K Ohno*); and others.

### MAGNETIC RESONANCE OF SOLID CARBONACEOUS FUELS — *Proceedings of the International Symposium of the same title at "PACHEM 89", the joint meeting of the Pacific Basin chemical societies in Honolulu, Hawaii, December, 1989.*

Published by the American Chemical Society as volume 229 (1992) of the *Advances in Chemistry* series. Edited by Robert E. Botto and Yuzo Sanada.

### ISMAR INTERNATIONAL WORKSHOP ON ELECTRON SPIN ECHO SPECTROSCOPY — *Proceedings of the meeting held in Novosibirsk, Russia (USSR), September, 1991* are published as a consecutive series of papers in the journal *Pure and Applied Chemistry*, volume 64, #6 (1992).

## NOTICES OF MEETINGS

**CANCELLATION: NINTH CONFERENCE ON MAGNETIC RESONANCE IN BIOLOGICAL SYSTEMS, Zvenigorod, Moscow region, RUSSIA.** This international conference was to have been held May 18-25, 1992. However, the organizers regret that the logistical and financial difficulties involved in arranging it at this time proved insurmountable, so the meeting was canceled. We hope to reschedule this conference some time in the future. Please watch these announcements for notice of a revised date and details. (Submitted by Professor Lev A. Blumenfeld and Professor Yakov S. Lebedev, Russian Academy of Sciences, Institute of Chemical Physics, Moscow.)

**6TH BIENNIAL MEETING SFRR INTERNATIONAL FREE RADICALS: FROM BASIC SCIENCE TO MEDICINE, June 16-20, 1992.** For more information, contact: Scientific Secretariat, c/o Dipartimento di Medicina e Oncologia Sperimentale, Sezione di Patologia Generale, Corso Raffaello 30, 10125 Torino, Italy.

**VI INTERNATIONAL SYMPOSIUM ON MAGNETIC RESONANCE IN COLLOID AND INTERFACE SCIENCE, Florence, Italy, June 22-26, 1992.** The 6th International Symposium on Magnetic Resonance in Colloid and Interface Science will be held at the University of Florence, Florence, Italy, June 22-26, 1992. This is a continuation of the previous triennial conferences held on the same subject in San Francisco, USA (1976), Mentone, France (1979), Torun, Poland (1983), Münster, FRG (1986), and Newark, Delaware, USA (1989). This symposium has become a major event; its aim is to provide a forum for physicists, chemists, and biologists at which they can present and discuss their recent research in

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the field. The symposium program will include plenary lectures, invited reports, and original research contributions. The official language will be English. The proceedings will be published as full articles in a major scientific journal.

A wide spectrum of the applications of magnetic resonance spectroscopies to colloid and interface systems will be addressed. Among the topics to be covered:

- Adsorption, catalysis, and surface chemistry
- Dispersed systems, colloids, and gels
- Ordered systems
- Zeolite and silicate surfaces
- Intercalation compounds
- Biological systems
- Magnetic systems with specific surface properties
- New magnetic resonance techniques

Other topics can be included depending on the response.

All scientific activities will be held downtown in Florence and all reservations for accommodations will be handled by local travel office directly. Detailed information will be sent in further circulars. Florence is easily reached by train from the international airports of Pisa (1 hour), Rome (3 hours), and Milan (3 hours).

For more information, and to indicate whether you wish to attend, and whether you wish to present a paper, contact: Dr. M. Francesca Ottaviani, Department of Chemistry, University of Florence, Via G. Capponi 9, 5021 Firenze, ITALY.

**GORDON RESEARCH CONFERENCE ON RADICAL IONS, Brewster Academy, New Hampshire, USA, June 22-28, 1992.** The 1992 conference will take place on the shores of Lake Winnepesaukee. Phil Rieger (Brown University) is the conference Chair; Alex Trifunac (Argonne), the Vice-Chair. In addition to the talks listed below, there will be time for some short talks and plenty of room for posters.

The following sessions are planned:

- Matrix Isolation Studies (Lon Knight, Session Chair): J. A. Howard, "Reactions of Naked Metal Clusters"; William Weltner, Jr., "Matrix Isolation Studies"; Paul Kasai, "Dissociative Electron Capture Processes in the Matrix Environment."
- Radical Ions on Surfaces: Ronald Birke, "Investigation of Radical Ions with Surface-enhanced Raman Spectroscopy"; Elio Giamello, "Small Radical Ions Stabilized on Solid Surfaces."
- Radical Ions in Biological Systems (Gary Brudvig, Session Chair): Gerald Babcock, "Electron Transfer in Photosystem II"; James Whittaker, "The Free-Radical-Coupled Copper Active Site of Galactose Oxidase"; Mark Nelson, "Radical Intermediates in Oxygenation of Fatty Acids by Lipoyxygenase."
- Radical Ions in Micelles and Surfaces (David Gosser, Session Chair): James Russling, "Electrochemical Studies of Radicals in Micellar Systems"; Akio Yasuda, "Electrochemistry-based Novel Molecular Electrochromics".
- Radical Ion Reactivity (Joe Dinnocenzo, Session Chair): Sason S. Shaik, "Cation Radicals and Nucleophiles. Reactivity

Patterns"; Vernon Parker, "Radical Cation-Nucleophile Reaction Barriers in Solution from Bas-Phase Quantities?"; Helmut Schwarz, "Gas-Phase Studies on Open-Shell Ions."

- Radical Ions from C<sub>60</sub> and Related Species (Paul Krusic, Session Chair): Keith Preston, "Paramagnetic Fullerenes"; Additional speaker to be named.

- Organotransition Metal Radical Ions (Dwight Sweigart, Session Chair): Edmund Samuel, "Formation and Reactivity of Group-4 Organometallic Radicals"; Martin Schröder, "Stabilisation of Metal Radicals in Co-ordination Complexes"; Brian Robertson, "Electron Transfer Involving a Reduced Carbonyl Cluster."

- Radical Ions in Polymers: Nigel Hacker, "Role of Cations, Radicals, and Radical Cation Intermediates in Onium Salt Photoinitiation Reactions"; Abbas Razavi, "New Aspects of Olefin Polymerization Reactions"; Shirley A. Fairhurst, "ESR Studies of Sodium-Doped Polyacetylene."

Attendance at this conference is strictly limited. To express interest or obtain information, contact Dr. Alexander D. Trifunac, Vice-Chair of Gordon Conference on Radical Ions, Argonne National Laboratory, 9700 S. Cass Ave., Argonne, IL 60439, USA. FAX: 708-972-4993. E-mail: BITNET Trifunac@ANLCHM.

**GORDON RESEARCH CONFERENCE ON MAGNETIC RESONANCE IN BIOLOGY AND MEDICINE, Tilton, New Hampshire, USA, July 13-17, 1992.** The organizer of the 1992 conference is Dr. Betty Gaffney, Department of Chemistry, Remsen Hall, 3400 N. Charles St., Johns Hopkins University, Baltimore, MD 21218, USA.

The deadline for applying to attend is May 29, 1992. For applications, contact Dr. Alexander Cruikshank, Director, Gordon Research Conferences, Gordon Research Center, University of Rhode Island, Kingston, RI 02881-0801, USA; telephone 401-783-4011; FAX 401-783-7644.

**ESR APPLIED METROLOGY WORKSHOPS, Japan.** Prof. Motoji Ikeya (Department of Physics, Faculty of Science, Osaka University, Toyonaka, Osaka 560, Japan) would like members of the international EPR community to know about these workshops. The first such workshop was organized in 1985, at the time of the First Symposium on ESR Dating, held at Yamaguchi, Japan; see the Proceedings of ESR Dating and Dosimetry (Ionics, Tokyo, 1985). Several annual workshops and symposia have been held since. Proceedings are available at a cost. For details and Workshop schedules, contact Prof. Ikeya, whose organization wishes to exchange information with foreign EPR specialists and to encourage more involvement of geologists in the EPR community.

**ELEVENTH ISMAR MEETING, Vancouver, British Columbia, CANADA, July 18-24, 1992.** The International Society of Magnetic Resonance will hold its XIth international meeting on the campus of the University of British Columbia,

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Vancouver, BC., Canada. The meeting is being organized by Professor Colin Fyfe, Department of Chemistry, University of British Columbia, 2036 Main Mall, Vancouver, BC, V6T 1Y6, CANADA. (☎: 604-228-2847; FAX: 604-228-2847).

**ROLES OF VITAMIN C & VITAMIN E IN FREE RADICAL REACTIONS, July 19-24, 1992**, FASEB Summer Research Conference, Federation of American Societies for Experimental Biology. Saxtons River, Vermont. Contact Dr. Richard C. Rose, Vitamin C-Vitamin E Conference, Dept. of Physiology and Biophysics, Chicago Medical School, 3333 Green Bay Road, North Chicago, IL 66064, USA.

(☎: 708-578-3000 or 708-578-3280).

**TWENTY-NINTH INTERNATIONAL CONFERENCE ON COORDINATION CHEMISTRY, Lausanne, Switzerland, July 19-24, 1992** covers all aspects of coordination chemistry including magnetic resonance. There will be five plenary lectures to cover themes of general interest, to which ten microsymbiosia will be linked conceptually. Fifteen subjects will be themes for section lectures, and there will be poster sessions. The official conference language is English. For information, contact 29th ICCS Secretariat, AKM Congress Service, Clarastrasse 57, P.O. Box, CH-4005 Basel, Switzerland. (☎: 41-61-691 51 11; FAX: 41-61-691 81 89).

**FIFTEENTH INTERNATIONAL EPR SYMPOSIUM at the 34th Annual Rocky Mountain Conference, Denver, CO, USA. August 2 to August 6, 1992.** Reports of new developments in all areas of fundamental and applied EPR spectroscopy were invited, and close to a hundred abstracts were received. The program which has been put together contains about ninety papers which cover a wide range of topics in electron paramagnetic resonance spectroscopy. Related to the *WORKSHOP ON THE FUTURE OF EPR* (see below), for which the papers and posters of the Symposium serves as background, the contributors to this year's Denver symposium were invited to emphasize (a) aspects of research that are limited by the state-of-the-art of commercial instruments and (b) new instrumental capabilities that provide new horizons for biomedical research. Special events will include (1) George Feher's acceptance of the first senior award of the International EPR(ESR) Society and (2) the annual business meeting of the Society. For more information, contact Profs. Gareth R. Eaton or Sandra S. Eaton, Dept. of Chemistry, University of Denver, Denver, CO, 80208, USA; E-mail: seaton@duclair.bitnet.

**SECOND WORKSHOP ON THE FUTURE OF EPR. On Friday, August 7, 1992 at Denver, CO, USA**, immediately following the 15th International EPR Symposium. The first Workshop was held in 1987 - see reports in *Spectroscopy* 3, 34 (1988), the *Bulletin of Magnetic Resonance* 10, 2 (1988), and the *Newsletter* vol. 1, no. 2, August 1988). The major aim will be to focus attention of researchers and instrument and software vendors on new EPR methodologies, instrumentation, and software that will enhance the power of EPR as a research resource. Formal presentations and panel discussions will clarify



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FAX: 414-258-4931

for researchers what is technically possible and what is likely to be successful in the marketplace. The predictions of the first Workshop will be tested against progress. Areas requiring critical breakthroughs will be identified to stimulate new research on resource development. Contact Profs. Gareth or Sandra Eaton, Dept. of Chemistry, University of Denver, Denver, CO, 80208, USA.

**ELEVENTH ANNUAL SCIENTIFIC MEETING AND EXHIBITION OF THE SOCIETY OF MAGNETIC RESONANCE IN MEDICINE** will be held August 8-14, 1992, at the International Congress Centre, Berlin, Germany. Four weekend educational programs will be offered on Saturday and Sunday, August 8 and 9: Basic and Advanced Clinical Magnetic Resonance Imaging, Basic Magnetic Resonance Spectroscopy, Advanced Magnetic Resonance Spectroscopy, and Basic and Advanced Magnetic Resonance Imaging for Technologists, offered both in English and in German. The scientific sessions will run 8:00 a.m. to 6:30 p.m. on Monday, August 10. This year's plenary topics will be blood flow, neurometabolism, tumor metabolism, new contrast mechanisms, and the staging and management of stroke. From Tuesday through Thursday the sessions will run 8:15 a.m. to 6:30 p.m. Friday's session will run 8:15 a.m. to 12:30 p.m. Two advanced mini-categorical courses will run Tuesday through Thursday, August 11-13, from 1:00 to 2:00 p.m. between the morning and afternoon scientific sessions.

A major innovation at the 1992 Annual Meeting will be the Society's inaugural Oxford Annual Lecture, to be given



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Monday, August 10, at 8:20 a.m. It is intended to be the first of a series, in which a major scientific or other speaker will talk to the Society on a matter of direct relevance to the future of our science which is likely to influence our thinking and understanding but which looks beyond our immediate problems and achievements. SMRM thanks **Oxford Instruments Group** for its generosity and vision in sponsoring this lecture.

**REGISTRATION** – on or before **July 8, 1992**;

SMRM BUSINESS OFFICE, 1918 University Avenue, Suite 3C, Berkeley, CA 94704 USA. ☎: 510-841-189  
FAX: 510-841-2340

**SIXTH INTERNATIONAL SYMPOSIUM ON ORGANIC FREE RADICALS**, August 16-21, 1992, Noordwijkerhout, The Netherlands. For more information, contact: Dr. Peter Mulder, OFR, CCE, Gorlaeus Labs, Leiden University, PO Box 9502, 2300 RA Leiden, The Netherlands.

**ICDIM 92 - INTERNATIONAL CONFERENCE ON DEFECTS IN INSULATING MATERIALS**, Nordkirchen, GERMANY, August 16-22 1992. Organized by Prof. Dr. O. Kanert, Fachbereich Physik, Universität Dortmund, and Prof. Dr. J.-M. Spaeth, Fachbereich Physik, Universität Paderborn. For details, contact Prof. Dr. Spaeth at Universität-GH Paderborn, Fachbereich 6 Physik, Warburger Strasse 100, D4790 Paderborn, GERMANY, Telefax: +5251 60 3216, Phone: +5251 60 2745 or 2743, Telex: 936776 unipb d.

**FIFTEENTH INTERNATIONAL CONFERENCE ON MAGNETIC RESONANCE IN BIOLOGICAL SYSTEMS**, Jerusalem, ISRAEL, August 16 - 21, 1992. The meeting will consist of plenary sessions, symposia and poster sessions. The conference will cover major topics of current interest in Magnetic Resonance in Biological Systems: \* Peptides and Proteins - Structure and Dynamics \* Protein-Nucleic Acid Interactions \* Stable Isotopes - Aided NMR Studies \* NMR and Drug Design \* Membranes and Lipid-Protein Interactions \* Biologically Active Polysaccharides \* Biological Solid State NMR \* EPR: New Biological Applications and Imaging \* Metalloproteins \* Magnetic Resonance of Photosynthesis \* NMR in Living Systems \* Cellular Metabolism - Mammalian, Bacterial and Plant Cells \* Quadrupolar Nuclei in Biological

Systems \* Advances in Magnetic Resonance Imaging and Microscopy \* New Experimental Methods.

The Second Circular is now available with information on some already-scheduled speakers, travel, tours, fees for conferees and guests, and accommodations. Optional tours include a preconference Galilee tour (August 14-16) and postconference day tours (Sunday, August 15: Old and new cities of Jerusalem; Friday, August 21: Dead Sea and Massada). For further details on this conference, contact the Organising Committee, G. Navon, Chairman, Tel-Aviv University, P.O. Box 50006, Tel-Aviv 61500, ISRAEL.

☎: 972-3-5174571; FAX: 972-3-655674/660325.

**TWENTY-SIXTH CONGRESS AMPÈRE ON MAGNETIC RESONANCE**, Athens, Greece, September 6-12, 1992. The sponsors of this conference are the Institute of Materials Science, NCSR Demokritos and the NATO Scientific Affairs Division.

**Call for papers:** A preliminary program has been established following suggestions of the International Advisory Board. It includes a few invited plenary lectures covering general aspects and invited symposia lectures on special topics of recent developments, new techniques and methods, as well as applications in the field of magnetic resonance. The program will be complemented by short oral contributions and poster sessions selected from contributed papers. The contributed papers will be judged solely on the basis of an abstract. An acceptance notice for either oral or poster sessions will be mailed to all authors by May 31, 1992; it will give details of the length of the oral papers and the size of the posters for display.

**Scope:** The conference will provide the opportunity for discussion of important recent experimental and theoretical results in the field of magnetic resonance. Its aim is to give the opportunity to scientists to present their work and discuss the results with leading scientists working at the frontier of the field.

There will be two plenary lectures daily followed by 2-4 symposia in parallel sessions. There will be poster sessions in the evening. A tentative list of plenary speakers includes R. Ernst (Zürich), P. Mansfield (Nottingham), M. Mebring (Stuttgart), A.K. Muller (Zurich), A. Pines (Berkeley), C.P. Slichter (Urbana), and H.W. Spiess (Mainz).

There will be symposia on several topics, including these: imaging (NMR, NQR, ESR), microimaging, new techniques and applications, optical detection, chaotic and fractal phenomena, ferromagnetic, paramagnetic, amorphous, disordered, and porous systems, liquid crystals, polymers, superconductivity, biological systems, glasses, phase transitions in ordered and partially ordered systems, and tunneling effects. **Contact:**

"CONGRESS AMPÈRE", Dr. F. Milin  
NCSR Demokritos, Ag. Paraskevi-Attiki  
153 10 Attiki, GREECE.

☎: +301 6513111 ext.127 or +301 6522872; Fax: (+301) 6519430; E-mail: fmilia@isosun.ariadne-t.gr (Internet) or milia@grathdem.Bitnet

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## SECOND EUROPEAN MEETING ON ESR APPLICATIONS IN ORGANIC AND BIOORGANIC MATERIALS, Lyon, FRANCE, November 5-6, 1992. *Scope and Topics of the Meeting:*

Following the 1990 ESR meeting on organic and bioorganic materials, the GARPE (Groupe d'Application de la Resonance Paramagnetique Electronique) is organizing a second European Symposium in Lyon on November 5 and 6, 1992. The intent of this meeting is to bring together industrial and academic researchers working in different fields in order to promote the practical applications of ESR spectroscopy and its derivated methods. Some theoretical and new aspects of this technique will also be discussed (high frequency, imaging, pulsed techniques). The elaboration and transformation of industrial products with such a variety of applications require a better understanding of basic phenomena in the range of ESR spectroscopy. Topics include ESR spectroscopy of paramagnetic species as well as spin trapping, spin probe and spin labelling methods in fields such as medical, biophysics, polymeric materials, ionised foods, diffusion phenomena, catalysis...

The program will include plenary lectures as well as oral (25 min including discussion) or poster presentations. Scheduled lectures: L.C. Brunel (F), M. Brustolon (I), A. Rassat (F), K.A. McLauchlan (UK), P. Tordo (F), and G. Martini (I).

**FREE RADICALS AND ANTI-ISCHAEMIC AGENTS, December 16-18, 1992, SFRR Europe/Biochemical Society Joint Meeting, London, United Kingdom.** For more information, contact Dr. Rice-Evans, UMDS, Lambeth Palace Road, London SE17EH, United Kingdom. ☎: 071-928-9292.

**INTERNATIONAL CONFERENCE ON CRITICAL ASPECTS OF FREE RADICALS IN CHEMISTRY, BIOCHEMISTRY AND MEDICINE, Vienna, AUSTRIA, February 14-17, 1993.** The organizers are Hans Nohl, president, (Vienna) and Hermann Esterbauer, chairman (Graz).

**Aims of the Conference:** The constantly increasing numbers of reports on free radicals makes it increasingly difficult to evaluate the significance and authenticity of scientific contributions to this field. Controversial findings and interpretations, although stimulating the promotion of scientific knowledge, make it necessary to critically appreciate experimental research conditions, model systems applied, and the biological relevance of results presented. Thus it seems compelling to concern scientists working in the free radical field with critical views of their research work. The aim of the Conference in Vienna is therefore a critical up-to-date survey to elaborate facts and fancies in free radical research.

**Scientific Program:** The scientific program will include the following topics, which are first introduced by the indicated overview speakers, followed by several specific lectures by invited speakers. All details will be announced in the second circular. Posters can be shown throughout the Conference; scheduled Poster Sessions will be held on Sunday, Monday and Tuesday. Opening lecture: Chemistry of free Radicals (R.L.

Willson, UK). Topics include Detection of free radicals in biological systems (E.F. Elstner, Germany), Biological sources of free radicals (B. Halliwell, UK), Consequences of oxidative stress (T.F. Slater, UK), Facts and fancy of free radicals in the pathogenesis of disease (M.H. Schoenberg, Germany), Role of natural antioxidants in treatment and prevention of disorders induced by oxidative stress (H. Sies, Germany; L. Packer, USA). There will be a workshop on smog (W.A. Pryor, USA).

**Second Circular:** To be mailed in June 1992. It will specify the details of the scientific program and include forms for final registration, information for the preparation of abstracts as well as hotel reservation forms. If interested in the second circular or participating in the Conference, immediately contact

**Conference Secretariat and Registration, Vienna Medical Academy of Postgraduate Medical Education and Research, Alser Str. 4, A-1090 Vienna, AUSTRIA**

☎: +43(1) 42 13 83-0, 84-0 or 65-0; Fax: +43(1) 42 13 83 23

Contacts for the Scientific Program are:

Prof. H. Nohl, Institute of Pharmacology and Toxicology, Veterinary University Vienna, Linke Bahngasse 11, A-1030 Vienna, AUSTRIA

☎: +43 1 711 55-450; Fax: +43 1 713 68 95

or Prof. H. Esterbauer, Institute of Biochemistry, University of Graz, Halbarthgasse 5, A-8010 Graz, AUSTRIA

☎: +43 316 31 330; Fax: +43 (316) 38 40 92

**EMARDIS-93 (THIRD INTERNATIONAL WORKSHOP ON ELECTRON MAGNETIC RESONANCE OF DISORDERED SYSTEMS), to be held near Sofia, BULGARIA, June, 1993.** The exact place and dates will be announced in the first circular in July, 1992. The aim is to cover all aspects of recent development in the theory, methodology, instrumentation, and experiments of electron magnetic resonance (EPR, ENDOR, ESE) spectroscopy of disordered systems in lectures, posters, and round-table discussions. Official language: English. Current plans are to start with dinner on a Monday and finish Friday after breakfast. On the same day, starting with dinner, the Q-EPR Expert Meeting (see next announcement) will commence. The Q-EPR meeting will close on Monday after breakfast.

Short abstracts of the EMARDIS-93 papers will be available at the meeting, and full papers based on the invited lectures will be published in a Proceedings about the end of 1993.

To receive the first circular and inquire about participation and preliminary registration, please contact one of the following:

(a) N. D. Yordanov (Convener) or M. Ivanova (Sci. Sec'y, Q-EPR), Institute of Kinetics and Catalysis, Bulgarian Academy of Sciences, 1113 Sofia, BULGARIA. Telex: 22729 echban. FAX: (+3592) 756-116 or 720-038; ☎: 713-2546 or 713-3917.

or (b) G. Gochev (Sci. Sec'y, EMARDIS), Department of Chemistry, Sofia University, 1 James Bourchier ave., 1126 Sofia, BULGARIA. ☎: (+3592) 62-561 ext. 223.

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**FIRST INTERNATIONAL EXPERT MEETING ON QUANTITATIVE EPR (Q-EPR), to be held near Sofia, Bulgaria in June, 1993** immediately following the EMARDIS-93 workshop; see the announcement immediately above.

**4TH ANNUAL INTERNATIONAL SYMPOSIUM ON SPIN TRAPPING AND AMINOXYL CHEMISTRY** to be held during 1993 at the University of Oklahoma Medical School. Professor Ed Janzen chairs organizing committee. Details on date forthcoming.

**WORKSHOP ON *IN VIVO* EPR AND EPR STUDIES OF VIABLE BIOLOGICAL SYSTEMS** to be held during 1993 at Dartmouth Medical School, Hanover, New Hampshire, USA. Harold Swartz, chair of organizing committee. Sponsored by the Illinois EPR Research Center (IERC) and held at the IERC Dartmouth site. Details on date forthcoming; to be coordinated with the 4th Annual International Symposium on Spin Trapping.

## POSITIONS OPEN

**POSTDOCTORAL/RESEARCH ASSOCIATE.** A position is available to study radical species derived from  $C_{60}$ . The project requires a knowledge of EPR spectroscopy. Electrochemistry experience would be helpful.

Send C.V. and three letters of reference to:

Prof. Sandra and Gareth Eaton  
Department of Chemistry, University of Denver  
Denver, CO 80208, USA

☎: 303-871-2980 or 303-871-3102

E-Mail: geaton@ducair.bitnet or seaton@ducair.bitnet

**POSTDOCTORAL/RESEARCH ASSOCIATE.** One or two positions available in projects using EPR spectroscopy in viable biological systems *in vitro* and *in vivo*. Required: background in EPR spectroscopy and/or working with viable cells and animals.

Send C.V. and three letters of reference to:

Dr. Harold Swartz, Dartmouth Medical School  
308 Strassenburgh Hall, HB7250  
Hanover, NH 03755-3863, USA

☎: 603-650-1955; FAX 603-650-1255

E-Mail: Harold.Swartz@Dartmouth.edu

**POSTDOCTORAL RESEARCH OFFICER POST IN PULSED E.S.R.** A U.K. collaborative project on coal characterisation is being carried out, The Essex contribution involves pulsed e.s.r., including echo techniques. We have constructed in-house, and use for such studies, a coherent electron spin echo spectrometer. A research officer is required to carry out the ESR studies. The candidate should preferably have experience in this technique, but a good understanding of coherent pulse spectroscopy is the essential requirement; this

might have been obtained in other fields such as solid state NMR. The initial appointment will probably be for one year, renewable for a further year, on the R.A.I.A. scale.

Send application letters, C.V., and two reference names to:

Dr. David Greenslade  
Department of Chemistry and Biological Chemistry  
University of Essex, Wivenhoe Park  
Colchester, CO4 3SQ, UNITED KINGDOM

**POSTDOCTORAL POSITIONS.** Positions available in laboratories associated with the ASU Center for the Study of Early Events in Photosynthesis. Research emphases include mutational analysis of photosynthetic reaction centers from algae, cyanobacteria, and green and purple bacteria, design and synthesis of biomimetic systems, and photosystem analysis by optical and EPR spectroscopy. Depending on the research project and mentor selected, the work may involve biochemistry, biophysics, molecular biology, organic chemistry, and/or physiology. Interdisciplinary interests are encouraged. Submit C.V. and application letter detailing research interests to:

Larry Orr, Program Coordinator  
Center for the Study of Early Events in Photosynthesis  
Arizona State University

Tempe AZ 85287-1604, USA

☎: 602-965-1963; Fax: 602-965-2747

E-mail: photosyn@ASUCPS.bitnet

## SITUATIONS WANTED

**ACADEMIC or INDUSTRIAL POSITION WANTED.** Solid state physicist. Ph.D.'88. Held academic fellowships and scholarships. Now NRC Research Associate at the Naval Research Laboratory. Teaching experience. Research experience in semiconductors utilizing EPR, cryogenic,  $SiO_2$  film fabrication, and various electrical measurement techniques. Seek faculty position with the opportunity to teach basic physical principles and laboratory techniques and to conduct research in the physical structure of materials, or industrial position offering some basic research opportunities. Please contact:

Dr. M. E. Zvanut  
Naval Research Laboratory, Code 6816  
Washington, DC 20375, USA

[☎: 202-767-3357]

**FREE RADICAL CHEMIST, 42, Cand. Chem. Sci. (Moscow State University, Russia) seeks new challenging research position.** 15 yrs university research/teaching experience in radiation chemistry, photochemistry, physical-organic chemistry, use of EPR and EPR Spin Trapping in chemistry and biology. Hands-on experience in EPR and Pulse Radiolysis. Interests: applying EPR, spin trapping, and time-resolved techniques to investigate structures and kinetics of short-lived free-radical intermediates; training graduate students; developing

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an independent interdisciplinary research program in free radical chemistry. Available now. Presently working in Germany. Contact Dr. V. Zubarev; FAX (international): 49-2461-612535

Valentin E. Zubarev, ICH-1  
Institut für Chemie  
Forschungszentrum Jülich, GmbH  
Postfach 1913, D-5170, FRG

**WANTED: POSITION IN THE FIELD OF EPR APPLICATIONS TO BIOCHEMISTRY.** An established scientist (age — mid-30's) with experience in the West, now a group leader at major Institute in Russia, wants to explore the possibilities of a position in the West. Contact the IERC in Champaign-Urbana, IL (address on p. 1) for a resumé.

## NOTICE

### NEW MECHANISMS OF SUPPORT FOR EAST-WEST SCIENTIFIC EXCHANGES

**GENERAL:** The US National Academy of Sciences sponsors exchanges of individual American scientists with colleagues from the USSR (FSU), Bulgaria, Czechoslovakia, Hungary, Poland, Romania, and Yugoslavia. The disciplines include physics; chemistry; mathematics and computer sciences; earth, atmospheric, and oceanographic sciences; agricultural, forestry, fishery, and plant sciences; biological sciences; environmental sciences; engineering; archeology/anthropology; geography; psychology; science and technology policy; history and philosophy of science. Other economics and social sciences projects of specified types will be considered.

The project categories supported are:

(1) LONG-TERM RESEARCH VISITS, (2) PROJECT DEVELOPMENT, (3) PROJECT DEVELOPMENT VISITS. Contact: Office of International Affairs, National Research Council, 2101 Constitution Avenue, NW, Washington, DC 20418 ☎: 202-334-3680

## EQUIPMENT & SUPPLIES EXCHANGE

### WANTED: EPR SPECTROMETER.

We are in need of a Varian E series EPR spectrometer, preferably an E-4, in good condition. A klystron for an E-3 is also useful. Contact:

Mark McNamee  
Department of Biochemistry and Biophysics  
University of California at Davis  
Davis, CA, 95616, USA  
☎: 916-752-6418; FAX: 916-752-3085.

### WANTED: USED VARIAN EPR SPECTROMETER.

We are looking for a used Varian E-line Century series EPR spectrometer (in working condition, please). While we would prefer an E-104, we will consider another model. Contact:

S. Tsuyoshi Ohnishi  
Philadelphia Biomedical Research Institute  
100 Ross and Royal Roads  
King of Prussia, PA 19406, USA  
☎: 215-962-0615. FAX: 215-254-9332

### WANTED: OLD OR JUNKED VARIAN E-3.

We need an old or junked Varian E-3 EPR spectrometer to be used for parts for one that is still running. Contact:

H. D. Gesser  
Dept. of Chemistry, U. of Manitoba  
Winnipeg, CANADA R3T 2N2  
☎: 204-474-9893. FAX: 204-275-0905

### WANTED: PAR BOXCAR-AVERAGER.

We are seeking a dual-channel boxcar-averager, PAR Model 162. Please contact:

Dr. Günter Grampp  
Institute of Physical Chemistry, University of Erlangen  
Egerlandstraße 3  
D-852 ERLANGEN, GERMANY

### AVAILABLE: VARIAN V 4500 MODULES

Modules for the Varian V4502 EPR spectrometer are available from G. R. or S. S. Eaton at the University of Denver.  
E-Mail: GEATON@DUCAIR.BITNET.

### NICOLET EPR COMPUTER SYSTEM FOR SALE.

The asking price is US\$2750 for the total system which includes the following components: NIC-1280 mainframe processor with 64K RAM, 8K ROM, 20 bit memory, cpu; power supply I/O board and X-Y interface. NIC-123/2 dual input 12 bit 333 kHz ADC; NIC-300A I/O; NIC-1280 dual disk interface; NIC-Zeta plotter; CDC "Hawk" dual disk drive with 4 extra cartridges; Teletype model 43 terminal; large cabinet on wheels for all components; various cables for connecting to Varian E-9. All manuals are included. Please contact:

Alfred F. Esser, University of Missouri  
Division of Cell Biology and Biophysics  
Kansas City, MO 64110, USA.  
☎: 816-235-5316. FAX: 816-235-5158  
E-Mail: aesser@umkcvox1.bitnet

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## MICRO-NOW INSTRUMENTS

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EPR spectrometers, components, accessories, and microwave equipment. Model 8320 Magnet Field Controller for replacing older controllers, *i.e.* Varian Mark I & II and other types.

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Address: 8260 N. Elmwood, PO Box 1488, Skokie, IL 60076, USA, ☎: 708-677-4700. FAX: 708-677-0394

### AVAILABLE: O<sub>2</sub>-SENSITIVE FUSINITE SAMPLES.

As described in a previous Newsletter (vol. 3, #1, pp. 13-14, 1/91), the Illinois EPR Research Center will provide, at cost (\$100) 1-g samples of fusinite for EPR oximetry. The EPR linewidth of this material is extremely sensitive to oxygen pressure or concentration. These samples are milled and screened to uniform maximum particle size and provided with some documentation.

To order or inquire, contact:

Becky Gallivan, IERC, University of Illinois  
(Address information on p. 1 of this issue)

### AVAILABLE: BOXCAR AVERAGER

An inexpensive boxcar averager designed for use in electron spin echo (ESE) spectrometers is available from the University of Denver. At slow repetition rates it gives about two orders of magnitude better S/N than the well-known PAR 162/164 boxcar.

Contact Richard Quine at the University of Denver (☎: 303-871-2419).

### WANTED: USED VARIAN EPR X-BAND CAVITY.

We need a Varian cavity, either TE<sub>102</sub> or TM<sub>011</sub> preferred, to fit an E-line or Century series EPR spectrometer. Many Varians have been scrapped, but people usually keep their cavities, if only for sentimental reasons. We would like to purchase your old cavity. We will have it reconditioned, if necessary - as these are no longer sold by Varian.

If you can help, please contact:

Professor Lawrence J. Berliner  
Department of Chemistry, The Ohio State University  
120 West 18th Ave.  
Columbus, OH 43210-1173, USA.

☎: 614-292-0134; E-Mail (Internet):  
berliner@livers.mps.ohio-state.edu.

### AVAILABLE: VARIAN 620L BOARDS

A full set of boards for the Varian 620L computer is available from the Eatons at the University of Denver (BITNET SEATON@DUCAIR).

### NEEDED: SURPLUS EQUIPMENT, BOOKS, etc.

My earlier Letter to the Editor (vol. 3, #1, January, 1991) explains how our institute has become sadly depleted in equipment and supplies in recent years. Can anyone help with a gift of surplus equipment (or parts)? Also, we could use surplus books or journals in the field (EPR and NMR) or in closely related areas (physical chemistry). We would appreciate help with transportation, but shall find a way to pay if necessary.

Dr. Horia Caldararu  
Romanian Academy, Institute of Physical Chemistry  
Splaiul Independentei 202  
77208 Bucharest, ROMANIA.

### AVAILABLE: VARIAN FIELD SCAN CONTROLLER CARDS

Any Varian magnetic field controller can be modified to permit control of the magnetic field by a computer. A fully documented printed circuit card and controller modifications is available from the University of Denver. Contact Richard Quine (303-871-2419).

### NITROXIDES FREE!

We have a large amount of two nitroxide radicals (both from Aldrich) to give away: 5g samples of 4-Hydroxy-TEMPO and 25mg samples of 4-Phosphonoxy-TEMPO hydrate.

Interested parties may contact me by Bitnet (address SCHWEIGER@CZHETH5A) or by mail:

Arthur Schweiger, Laboratory for Physical Chemistry  
ETH-Zentrum  
CH-8092 Zürich, SWITZERLAND

### TEMPO DERIVATIVES FREE!

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Anatol E. Myshkin, N.N. Semenov Institute of Chemical  
Physics of the Russian Academy of Sciences  
Kosygin str., 4.  
117977 Moscow V-334, RUSSIA

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## APPENDIX

### Constitution of the International EPR(ESR) Society

#### Article I. Name

The name of this Society shall be the International EPR(ESR) Society, hereinafter called "the SOCIETY".

#### Article II. Objectives

The objectives of the SOCIETY shall be:

(a) To advance and stimulate knowledge of the principles, recent developments, and applications of Electron Paramagnetic Resonance (EPR) spectroscopy and related techniques;

(b) To communicate information and news about EPR and its applications among its members and to serve as a clearing house on EPR among scientists in academia, government, and industry;

(c) To encourage appropriate and useful application of EPR in a wide variety of fields including physics, chemistry, biology, medicine, geology, and other disciplines;

(d) To provide a central voice for the EPR community by promoting support for research and development utilizing EPR through interaction with other societies, government funding agencies, and international scientific organizations;

(e) To stimulate educational programs on EPR and related spectroscopies through organization of schools, workshops, courses, and seminars;

(f) To foster scientific interaction among EPR spectroscopists throughout the world and to engage in any lawful activities which further this end.

The SOCIETY is to be international in scope and is to cover the entire range of disciplines that use EPR.

#### Article III. Membership

1. The SOCIETY shall consist of Regular Members, Student Members, Postdoctoral Members, Emeritus Members, Associate Members, and Institution Members.

(a) Regular Members. Any person who has made a personal contribution to the advancement of EPR or its applications shall be eligible to become a Regular Member.

(b) Student Members. Any student actively engaged in EPR research or its applications shall be eligible to become a Student Member.

(c) Postdoctoral Members. Any person engaged in EPR research or its applications and holding a postdoctoral position shall be eligible for this status of membership for up to three years.

(d) Associate Members. Any person supporting the objectives of the SOCIETY, and who is not eligible as a Regular Member, shall be eligible to become an Associate Member.

(e) Emeritus Members. Any person whose professional activities qualify him/her for status as a Regular Member and who holds emeritus status or the equivalent.

(f) Institutional Members. Any institution supporting the objectives of the SOCIETY shall be eligible to become an Institutional Member.

2. Admissions. Persons satisfying the required conditions may become Members of the SOCIETY, in the appropriate category, on making written application to the Secretary of the SOCIETY and on paying the membership fee established for that category.

3. Rights and Privileges. All Members of the SOCIETY shall have the right to attend any meeting of the SOCIETY and to participate in the discussion, to hold office, and to vote on candidates for office and on matters of policy.

4. Termination of Membership. Membership of the SOCIETY may be terminated by resignation in writing, or, as provided in Article VIII, by nonpayment of membership fees.

#### Article IV. Council and Officers

1. Council. The management of the SOCIETY shall be vested in a Council consisting of the President, the Vice President, the immediate Past President, the Secretary, the Treasurer, as Officers, and elected Council members. The Council shall consist of not less than 20 members nor more than 40 members, plus the Officers. The composition of the Council shall provide for a balanced international and geographical distribution, as well as a proper balance of researchers in different branches of EPR.

The term of office of elected members of the Council shall be three years, subject to re-election for no more than one further period of three years.

The Council shall meet at least once per year, normally during a suitable scientific conference. Business may be transacted by mail between meetings. The Council will determine its own rules of conduct of business.

2. President. The President shall be the chief executive officer of the SOCIETY and shall chair meetings of the Council. The President shall direct the general affairs of the SOCIETY and execute such other duties as may be determined by the Council. The term of office of the President shall be three years, and any person may serve only one term as President, except that if the Vice President succeeds to the office as a result of the death, disability, or resignation of the President, such service shall not be counted as a regular term.

3. Vice President. The Vice President will carry out any duties assigned by the President or Council, will carry out the duties of the President in the absence of that person, and shall assume the office of President in the event of the death, disability, or resignation of the President. The term of office shall be three years.

4. Secretary. The Secretary shall maintain all the records of SOCIETY meetings, and be responsible for the distribution of all essential information to members. The term of office of the Secretary shall be three years, subject to re-election for no more than two further periods of three years.

5. Treasurer. The Treasurer shall have custody of all funds of the SOCIETY, collect all dues and disburse funds in accordance with the direction of the Council. The Treasurer shall maintain proper books of accounts for the SOCIETY. The term of office of the Treasurer shall be three years, subject to re-election for no more than two further periods of three years.

6. Executive Committee. The SOCIETY's day-to-day affairs shall be conducted by the Executive Committee in accordance with the general directions of the Council. The Executive Committee shall consist of the President, the immediate Past President, the Vice President, the Secretary, and the Treasurer.

#### Article V. General Meetings

1. General Meetings of the SOCIETY shall be held during suitable scientific meetings at least once every three years. All participants at that scientific meeting may attend and speak at such

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meetings; only members of the SOCIETY may vote. The President of the SOCIETY, or the President's designate, shall chair any General Meeting.

2. Quorum. The Quorum for a General Meeting shall be at least 20 Members in attendance. By decision of the Council any matter deemed to be of major impact on the SOCIETY shall be submitted to the Membership for a mail ballot.

## Article VI. Standing Committees

1. In addition to the Executive Committee, there shall be the following Standing Committees:

Nominating Committee  
Elections Committee  
Awards Committee

The Council may appoint other Committees as required. Recommendations concerning Conferences, Symposia, Courses, and Schools shall be the business of the Executive Committee. A majority of a Committee shall constitute a quorum for business. All recommendations of the Committees are subject to approval by the Council.

2. Nominating Committee. The Nominating Committee shall consist of at least five persons appointed by the Council to serve for three years. The immediate Past President shall be an automatic member of the Nominating Committee and shall chair its meetings. The members of the Nominating Committee shall have an international distribution and reflect a range of scientific aspects of EPR. Members of the Nominating Committee may not be candidates in the elections for which they have prepared nominations. They shall have particular regard to a geographical and international distribution of nominees and to balance of scientific aspects of EPR. In particular, successive Presidents should come from different countries. Nominations may also be received by petition signed by at least five Regular Members and accompanied by a written statement from the nominee of willingness to serve.

3. Elections Committee. The Elections Committee shall consist of three members from different institutions appointed by the Council to serve for three years. Members of the Elections Committee may not be candidates in the elections as Officers of the SOCIETY. The Elections Committee shall conduct all elections and mail ballots of the SOCIETY.

4. Awards Committee. The Awards Committee shall consist of five members appointed by the Council to serve for three-year terms. Any member of this Committee may be appointed by only one additional three-year term. The Awards Committee shall administer all awards of the SOCIETY, shall solicit nominations for awards, and decide on winners of awards. No member of the Committee may, while on this committee, be a nominee for any award of the SOCIETY.

## Article VII. Elections

1. The Members shall vote on ballot papers distributed to them by the Secretary. The ballot papers shall be returned to the Office of the SOCIETY in signed, sealed envelopes by mail. Mail ballots must be received prior to a date specified by the Secretary after consultation with the Elections Committee.

2. On receipt of all the ballots for an election, the Secretary shall turn over the ballots to the Elections Committee, which shall open the

ballots, tally the votes, and prepare a report of the election, which shall be circulated to members of the SOCIETY.

3. Elections will be held every three years. In the event that an Office of the SOCIETY or a position on the Council becomes vacant due to any cause, the Nomination Committee will nominate a candidate or candidates and a special election will be carried out as soon as feasible.

## Article VIII. Fees

1. Fees. The fees (annual subscription) for the various membership categories of the SOCIETY shall be determined by the Council.

2. Waiver of Fees. The Treasurer may waive the membership fee of a Member for good reason. If because of currency restrictions in a Member's country, Members shall have the option to pay their dues in the currency of their country to a Committee in that country that has been established by the SOCIETY.

3. Nonpayment of Fees. A Member who has not paid the appropriate membership fee by three months after the expiration of the membership period shall be sent a notice of pending termination of membership. If the fee has not been paid by six months after the expiration of the membership period, that person shall cease to be a Member of the SOCIETY.

## Article IX. Miscellaneous Provisions

1. Incorporation. The Council may arrange for the SOCIETY to be incorporated in a particular country or state, if it is deemed advantageous to do so. If, for the purposes of incorporation, the SOCIETY requires a Board of Directors or Trustees, then the members of the Council shall be the Directors or Trustees.

2. Office of the SOCIETY. The Office of the SOCIETY shall be established at an address determined by the Council.

3. The Financial Year of the SOCIETY shall be the same as the calendar year.

4. Audit. The accounts of the SOCIETY shall be reviewed annually by appropriate independent professionals. A report shall be presented to the Council and reported to the Membership.

5. Divisions. The Council may approve the formation of Divisions to encompass specialized areas of scientific interest within the EPR field, and shall determine the conditions of operation of such Divisions.

6. Affiliations. The SOCIETY may maintain affiliations with other appropriate organizations as determined by the Council.

7. Amendments. Any provision in the constitution may be amended, or repealed by two-thirds majority of the Members casting ballots in a mail ballot, except that for the first two years of the existence of the SOCIETY a simple majority of those voting will be sufficient.

8. Dissolution. The SOCIETY may be dissolved by a two-thirds majority of those Members casting ballots in a mail ballot. The assets of the SOCIETY will be distributed in a manner determined by the Council and in accordance with the provisions of the Articles of Incorporation, in a manner that is consistent with the non-profit status of the SOCIETY.

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This publication is the official newsletter of the INTERNATIONAL EPR(ESR) SOCIETY. It is supported by the Society, by corporate and other donors, and by three national Centers for EPR/ESR spectroscopy in the USA. These Centers are sponsored by the Division of Research Resources, U.S. National Institutes of Health:

**National Biomedical ESR Center**, Prof. James S. Hyde, Director. Medical College of Wisconsin, MACC Fund Research Center Building, 8701 Watertown Plank Road, Milwaukee, Wisconsin 53226, USA. ☎: 414-266-4000. FAX: 414-266-4007. E-Mail (INTERNET): felixc@uvax01.biostat.mcw.edu

**Biotechnology Resource in Pulsed EPR Spectroscopy**, Prof. Jack Peisach, Director. Albert Einstein College of Medicine, Department of Molecular Pharmacology, 1300 Morris Park Avenue, Bronx, New York 10461, USA. ☎: 212-430-2175. FAX: 212-829-8705. E-mail (INTERNET): peisach@aecom.yu.edu

**Illinois EPR Research Center (IERC)**, Prof. R. Linn Belford, Director; Prof. Harold M. Swartz, Co-Director; Prof. Robert B. Clarkson, Associate Director; Prof. Peter G. Debrunner, co-Principal Investigator; other senior staff: Prof. Mark J. Nilges, Dr. Alex Smirnov, Laboratory Manager, and Dr. Tadeusz Walczak; University of Illinois at Urbana-Champaign, 190 Medical Sciences Building, 506 South Mathews Ave., Urbana, Illinois, 61801, USA. ☎: 217-244-1186. FAX: 217-333-8868. E-mail: belford@rlb6000.scs.uiuc.edu or ierc@uiucvmd.bitnet.

(IERC also operates a satellite site for EPR *in vivo* at Dartmouth University in Hanover, New Hampshire; ☎: 603-650-1955; FAX 1225. E-mail: harold.swartz@dartmouth.edu)

These Centers, which were described in our first issue (Volume 1, #1), cooperate to facilitate research requiring EPR-related techniques. Prospective collaborative or service users may contact the staff at any of the Centers.

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**HOW TO REACH US** — To communicate about the EPR Newsletter or submit material, contact R. Linn Belford, Editor or Becky Gallivan, Editorial Assistant, at IERC (address above).

**PUBLICATION AND DISTRIBUTION:** This is a members' issue. EPR Newsletters are published quarterly for the members (ca. 1000) of the International EPR (ESR) Society. One issue (which was the winter issue in 1991) each year is public, which the (ca. 2000) nonmembers on our mailing list also receive. The publication date indicates approximately when an issue goes to press. Much of the distribution is by volunteer effort (including some by JEOL and a great deal by Bruker, USA as part of their support for the Society) and often by bulk mail. Dated material such as meeting notices thus should be sent to the editor as early as possible to insure that it reaches the readers well before the critical dates.

## INTERNATIONAL EPR SOCIETY

### CONFERENCE TRAVEL GRANTS FOR STUDENTS - REPORT AND CALL FOR APPLICATIONS:

The International EPR Society provides travel grants to students (including postdoctoral student members of the Society) to help defray their expenses in traveling a long distance to present EPR-related work at an appropriate conference (see "Notices of Meetings" in each Newsletter).

**Call for applications** - A student may apply for an award of up to \$250(US) in a brief (1-2 page) letter with (1) some information about him/herself, (2) reasons for wishing to attend and present work at the particular meeting specified, and (3) the endorsement of the student's research advisor. The Awards Committee makes all decisions and announces results to all applicants. Send applications to Prof. L. J. Berliner, co-Chair, IES Awards Committee, Dept. of Chemistry, The Ohio State University, 120 West 18th Ave., Columbus, OH 43210-1173, USA. ☎: 614-292-0134; E-Mail: berliner@livers.mps.ohio-state.edu

**Report on travel awards granted before July 1, 1992** - Names and locations of recipients and conferences they proposed to attend:

#### Awarded in 1991:

Mariana Ivanova, Sofia, Bulgaria, Recent Advances in ESR Spectroscopy, Padoa, 1991.

Xiaoling Tang, Albany, U.S., Rocky Mountain Conference, Denver, 1991.

#### Awarded in 1992:

Barbara Blicharska, Krakow, Poland, Magnetic Resonance in Colloid and Interface Science, 1992.

Ju. V. Bogachev, St. Petersburg, Russia, Magnetic Resonance in Colloid and Interface Science, 1992.

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Hassane Mchaourab, Milwaukee, USA, Rocky Mountain Conference, 1992.

Frans van Meighem, Gif-sur-Yvette, France, International Conference on Magnetic Resonance in Biological Systems, 1992.

Boris Nikolaev, St. Petersburg, Russia, Magnetic Resonance in Colloid and Interface Science, 1992.

Nicholay Steinschneider, Moscow, Russia, Magnetic Resonance in Colloid and Interface Science, 1992.

Y.-P. Zhang, Calgary, Canada, Rocky Mountain Conference, 1992.

## ANNOUNCEMENT OF A PROGRAM FOR SUPPORT OF TRAVEL TO MEETINGS INSIDE EASTERN EUROPEAN COUNTRIES

In recognition of the special problems that are being faced by our colleagues in these countries because of the precipitous drop in the support of science due to general economic difficulties, the International EPR Society has established a temporary system of grants to facilitate travel to EPR related meetings within these countries. This program is considered to be a temporary exception to the general policy of the International Society which is to provide travel stipends only to students and very junior scientists, but during this emergency period, these small travel grants will be available to all scientists, junior and senior, in Eastern Europe. The program is based on the assumption that small amounts of hard currency funds may make travel to meetings possible in these countries. A total of \$500 for this purpose has been allocated and will be administered and distributed by a committee chaired by Yakov Lebedev (Institute of Chemical Physics, Russian Academy of Sciences, Kosygin Str.4, 117977 Moscow V-334, Russia). It is anticipated that the amount of hard currency required for the individual travel awards will be relatively small, approximately \$10 to \$25. Scientists wishing to apply for these travel awards should

write directly to Professor Lebedev, providing details on the meeting to be attended and the amounts of hard currency required for the travel expenses.

We're hopeful that the situation in the Eastern European countries will stabilize rapidly so that such emergency funding will not be required. The program will be reviewed after one year to determine whether a second year is needed and justified.

Harold M. Swartz, President, IES

**CORPORATE MEMBERSHIPS:** The International EPR(ESR) Society welcomes supporting companies to four classes of corporate membership carrying different fees and privileges, as described in the EPR Newsletter, Vol. 2 #3, October, 1990, p. 7). Currently, there are ten corporate members; see their display boxes in this issue.

## REPORT OF THE IES SECRETARY:

### Report on recent ballots—

#### A. Ballots for Vice President of the Society:

- 89 for Karl Hauser
- 2 for Klaus Möbius
- 1 for Mike Bowman
- 1 for Hening Paul
- 1 abstention

94 total ballots as of May 5, 1992

#### B. Ballots for approval of the Constitution of the Society:

- 90 accept the Constitution as printed in the Fall 1991 Newsletter
- 2 rejections
- 2 abstentions
- 94 total ballots as of May 5, 1992

#### C. Suggested changes to the Constitution:

Several ballots suggested specific wording changes, which are presented verbatim in the following:

1. VI.4. "appointed by only" ---> "appointed for only"
2. VII.3. 2nd sentence -- rewrite to clarify meaning: "Officer...becomes vacant"?

## BRUKER INSTRUMENTS, PATRON of the International EPR Society

Supplier of CW or pulsed EPR/ESR spectrometers, ENDOR units, magnets, and other accessories.

For information on products and to determine the sales and service representative for your country, contact Dr. Dieter Schmalbein, Bruker Analytische Messtechnik, Division IX-EPR, D-7512 Rheinstetten-4-Fo. am Silberstreifen, Germany.  
Telephone: 49 721 5161 141; FAX: 49 721 5161 237.

In USA, contact Dr. Arthur Heiss, 19 Fortune Dr., Manning Park, Billerica, MA 01821. Tel: 508-663-7406; FAX: 508-667-3954.

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## **NORELL, Inc.** is a CONTRIBUTOR to The International EPR Society

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3. VII.2. "If because of" ---> "Because of" or "If there are" or other change to clarify.
4. Article VI leave out the description and term of the office of Secretary. This must be rectified to be a consistent document.
5. The Secretary is mentioned in Article VII, but I see no description of this office. The Secretary, who is responsible for tallying elections, should be item 5 of Article IV, I suppose.
6. If not someplace where I missed it, the Constitution should state that the Council members are elected by a majority (simple) of Society members casting ballots.

Gareth R. Eaton, Secretary of the Society  
Report submitted May 5, 1992

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## **FROM THE EDITOR**

The topic of nomenclature is still with us, including the apparently controversial question of whether we do ESR, EPR, or EMR. Both Charlie Poole's article and Hal Swartz's guest editorial in this issue have something to say about this topic. I'm sure you'll find them interesting, as I did.

To all our readers: We rely on you to contribute material of interest to others in the EPR community. My editorial in the preceding issue (Winter, 1991) lists some appropriate kinds of contributions. We particularly urge you to provide timely information on meetings to be held and on recently or soon-to-be published books or conference proceedings pertaining to EPR. If such information comes to your attention, please tell us about it; don't assume that someone else has notified us! Brief reports of recent meetings are also welcome. Other material published includes articles, letters to the editor, ads, notices, technical tips, etc.

(see the Editorial in the last public issue v.3,#4). Important: please indicate whether the material (ads, notices, etc.) ought to run in more than one issue, and notify us promptly when a notice or ad should be discontinued. In the absence of such indication, ads and some notices are repeated automatically in one or more subsequent issues, space permitting. It is helpful if paper copy is accompanied by text and graphics (for example, .PCX or .TIF files) submitted on IBM-compatible computer diskette or transmitted by E-mail. Submission of material implies permission to edit or modify it for publication. Normally, proofs are not sent.

R. Linn Belford

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## **GUEST EDITORIAL**

### **??THE LAST WORD ON EPR VS ESR??**

This topic now has occupied significant attention in the Newsletter and at several meetings. Almost all would agree, in principle, that the topic has little intrinsic importance, and that it also is clear that there would be some real benefits to avoiding the use of two different terms to describe the same experimental technique. In spite of these apparent agreements, however, attempts to settle on a single term have elicited much more heat than light. Strong, apparently logical arguments have been put forth for one term or the other. An attempt at a declared consensus, irrespective of the logic of the choice, also has been put forth with the advocacy by the Society (and also of a IUPAC nomenclature document) of the consistent use of EPR, and many of us former ESR people have, albeit reluctantly, become EPR people. But even though there was a call for consensus without requiring acquiescence in the logic of the choice, very significant numbers of our colleagues prefer to use ESR.

The solution, I believe, is to further compromise on the initial compromise (the latter was to use EPR while admitting that it was not necessarily the superior term). The new and, I hope, final compromise is this: while continuing to ask people to use EPR as the preferred term, we ask those who choose not to do so always to include, at least one time in each publication, a note that EPR is used equivalently to ESR. Similarly, those that do choose to use EPR as the primary term are urged to make a similar note regarding the use of ESR.

The official title of the Society "The International EPR (ESR) Society" is an example of a useful application of this philosophy of the nomenclature. An

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Published at the Illinois EPR Research Center (IERC), Urbana, IL 61801, USA

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## JEOL

EPR

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PEABODY, MA 01960  
(508)535-5900

alternative is the use of something similar to the following, which my group uses the first time the name of the technique appears in a publication: "Electron Paramagnetic Resonance (EPR or, equivalently, ESR or electron spin resonance)".

Although one reasonably could say that the whole issue is silly, in fact there are many people outside the field who are familiar with only one of the terms and who therefore do not appreciate that they are dealing with the same technique when the other term is used. This situation can only serve to make appreciation of the field less likely and therefore the awkward terminology seems to be worth employing. And perhaps the major advantage of adopting this convention is that we would stop talking about this particular problem, and maybe deal with more significant topics!

Harold M. Swartz

## LETTERS TO THE EDITOR

Sir:

I enjoyed reading Chris Bender's Technical Note in Vol. 4 No. 1 (Spring, 1992). Readers may be interested in our Bulletin #7, which describes precise Microwave Frequency Generation using EIP Self Locking Counters. This is the same technique that Dr. Bender described. Besides EPR (ESR) Spectrometers, Micro Now also manufactures a line of microwave signal sources and sweep generators using YIG oscillators. These are used by several EPR spectroscopists for pulse applications requiring a stable source. We will supply copies of our Bulletins on request.

Clarence Arnow, President  
Micro-Now Instruments  
8260 North Elmwood Street  
P.O. Box 1488, Skokie, IL 60076, USA

Sir:

We would like to inform your readers of the availability of instruments developed in our laboratory. After more than 30 years of research in the EPR laboratory of St. Petersburg Electrical Engineering Institute, compact problem-oriented EPR equipment was developed which opens up new prospects for the intensification of research and practical use in medicine, ecology, geology, dosimetry for control and monitoring technical processes in industry and those in education. The EPR equipment described is characterized by high performance, reliability and simplicity, small size and low cost.

The EPR equipment includes some modifications of compact EPR spectrometers and EPR analyzers which consist of microwave X-band units of homodyne or threshold type with low-noise Gunn oscillator, compact low-weight magnet systems incorporating electromagnets or permanent magnets with scan coils, magnetic field digital processing and acquisition of the EPR data and power supplies.

In addition we can propose a compact digital variable temperature system, a  $TE_{011}$  mode cavity, a liquid flow mixing cell, an insertion type liquid Nitrogen dewar, imidazoline and imidazolidine nitroxides used as spin labels, probes and traps.

Recently we organized the St. Petersburg Instruments Ltd. company for manufacturing the EPR equipment and established business relations with Norell, Inc. for promoting our developments in the USA and Canada.

For more information, contact:

In the USA or other western countries-

Mark W. Norell, President

Norell, Inc., 22 Marlin Lane

Mays Landing, NJ 08330, USA

☎ 609-625-2223; Fax: 609-625-0526; Telex: 5106006283

In Russia or former USSR-

Dr. Valeri Z. Drapkin, President

St. Petersburg Instruments, Ltd.

P.O. Box 123

St. Petersburg 194156, RUSSIA

☎ 007-812-234 96 56

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## ***ELECTRON MAGNETIC RESONANCE AND ITS SISTER FIELDS***

Charles P. Poole, Jr.  
University of South Carolina  
Department of Physics & Astronomy  
Columbia, SC 29208, USA

When this Newsletter began publishing there was some discussion about the name of our field; should it be called electron spin resonance or electron paramagnetic resonance, ESR or EPR. We have written many articles with both names in the titles, and professors Wertz and Bolton have coauthored books with both titles. Other names have appeared from time to time, such as electron magnetic resonance or electronic magnetic resonance, in analogy with nuclear magnetic resonance, and EMR might be a good compromise acronym. The lack of unanimity in nomenclature is attested to by the fact that starting in 1948 Physics Abstracts (PA) has used the indexing category 'paramagnetic resonance' for our field.

While we were writing a chapter for a Handbook on this subject we compiled Table I, which shows the extent to which the two names retrieve articles in the major computer databases of the fields of Biology, Chemistry, Engineering, Geology, Medicine and Physics. We see from the table that in our field of Physics, which has the highest percentage of these articles (0.534%), EPR is slightly ahead, while Chemistry, which has the largest number of articles (52,273), shows a preference for ESR. In four of the six fields ESR is preferred. The figures in the table cannot be added to give an accurate measure of the extent of the literature since many pertinent articles do not mention ESR or EPR in the title or abstract. Note that the starting year of Georef actually is 1785!

Table 1. Number of ESR/EPR articles found by computer searching. The starting year and number of records is given for each database.

FIELD	DATABASE	ESR	EPR	ESR or EPR	ESR & EPR	% of Articles
Biology	Biosis Preview 1969, 7.7M	6,905	5,639	1,241	83	0.16
Chemistry	Ca Search 1967, 10.3M	39,727	18,883	52,273	6,337	0.51
Engineering	Compendex Plus 1970, 2.8M	4,662	2,924	7,559	26	0.27
Geology	Georef 1785, 2.8M	334	719	983	80	0.06
Medicine	Medline 1966, 6.9M	3,431	2,240	5,598	73	0.08
Physics	Inspec 1969, 4.0M	10,971	11,920	21,309	1,582	0.53

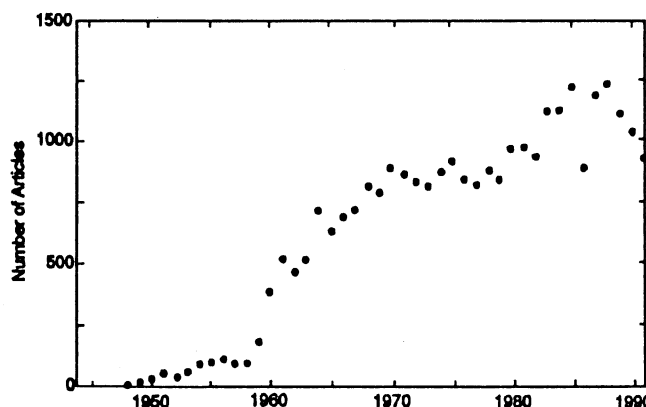


Figure 1. Growth of literature in the field. Abstract year data from 1945 to 1989 was obtained from Physics Abstracts, and publication year data from 1970 to 1990 obtained from Inspec.

The table was compiled by searching for articles which contain the acronyms ESR and/or EPR, and this provided data sets of 21,309 and 52,273 for PA and Chemistry Abstracts (CA), respectively. Additional articles found by including in the search the word spin adjacent to resonance, and paramagnetic adjacent to resonance, enlarged the data sets to 25,373 and 54,030, respectively.

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Direct inquiries to Dr. Philip D. Morse II, Scientific Software Services,  
305 East Locust, Bloomington, IL 61701 USA (309) 829-9257

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These could doubtless have been enlarged further by adding other terms, or by including articles which list these present terms as key words. We would not expect this to

**Table 2.** Number of EPR/ESR articles in various journals during the past two and a half decades.

Journal	Number of Articles		Percent of ESR/EPR Articles	
	ESR or EPR	total	in journal	in field
J. Chem. Phys	1,656	43,132	3.84	7.30
J. Phys. Chem.	1,618	31,900	5.07	3.05*
Phys. Status Solidi	1,254	32,499	3.86	5.52
Phys. Rev. B	1,188	67,506	1.76	5.23
Chem. Phys. Lett.	1,112	24,136	4.61	4.90
Soviet Phys. Solid State	1,004	19,255	5.21	4.42
Solid State Comm.	781	20,343	3.84	3.44
J. Magn. Reson.	852	5,547	15.36	1.61*
J. Physics	591	23,884	2.47	2.60
J. Phys. Soc. Japan	456	16,407	2.11	2.01
J. Amer. Chem. Soc.	427	12,576	3.40	0.81*
Phys. Rev. A, C, D	320	67,961	0.47	1.41
Phys. Lett. A and B	314	47,778	0.66	1.38
Molec. Phys.	301	6,729	4.47	1.33
J. Appl. Phys.	297	36,287	0.82	1.31
Physica	269	18,996	1.42	1.19
J. Phys. Chem. Solids	268	5,034	5.32	1.18
J. Organometal. Chem.	255	16,151	1.58	0.48*
J. Organ. Chem.	214	32,828	0.65	0.40*
Soviet Phys. Semicond.	205	12,296	1.67	0.90
Phys. Rev. Lett.	182	29,384	0.62	0.80
Rev. Sci. Instr.	164	12,086	1.36	0.72
Soviet Phys. JETP	155	10,564	1.47	0.68
J. de Physique	83	4,093	2.03	0.37
Soviet Phys. Doklady	64	10,053	0.64	0.28
Canadian J. Phys.	60	6,476	0.92	0.26
Canadian J. Chem.	58	2,027	2.86	0.26
Org. Magn. Reson.	51	2,302	2.22	0.10*
Soviet Phys. Tech. Phys.	26	11,175	0.23	0.11
Proc. Phys. Soc.	25	3,411	0.73	0.11
J. Molec. Spect.	21	5,304	0.40	0.09
Biol. Magn. Reson.	18	53	33.96	0.03*
TOTAL	14,289			54.50%

\*The data were obtained from Inspec, except for the cases marked with an asterisk in the last column, where the information came from CA Search.

change the ESR/EPR ratios, but it would increase the percentages in the last column of the table.

**Table 3.** Number of articles found in Inspec (25373) and CA Search (54030) for various electron spin resonance subfields.

Subfield	INSPEC		CA Search	
	Number	Percent	Number	Percent
Acoustic, Ultrasonic	364	1.43	144	0.27
Center	2,956	11.65	4,141	7.66
Conduction Electrons	575	2.27	388	0.72
ELDOR	101	0.40	93	0.17
ENDOR	1,592	6.27	1,996	3.69
Irradiation, Radiation	3,426	13.50	4,361	8.07
Lineshape, Linewidth	2,279	8.98	560	1.04
Mineral, Geology	236	0.93	840	1.55
Optical, ODMR	3,322	13.09	19,805	36.66
Phase Transition	883	3.48	696	1.29
Polarization, CIDEP	862	3.40	694	1.28
Pulsed	322	1.27	204	0.38
Radical	4,146	16.34	13,346	24.70
Relaxation	2,956	11.65	1,904	3.52
Semiconductor	3,637	14.33	512	0.95
Spin Label, Nitroxide	663	2.61	2,793	5.17
Superconductor	589	2.32	613	1.13
Theory	2,244	8.84	872	1.61
Transition Ion, Rare Earth plus Individual Ions	11,780	46.43	18,654	34.53
Triplet	1,120	4.41	1,303	2.41
Other	--	--	9,298	17.21
TOTALS	44,053	173.60%	83,217	154.02%

The readers of this Newsletter might also be interested in two other tables that we prepared for the Handbook project. Table 2 shows the extent to which different journals publish ESR/EPR articles. We see that the percentage of articles on this subject is particularly high in the specialized Journal of Magnetic Resonance, but other periodicals such as the Journal of Chemical Physics and the Journal of Physical Chemistry publish more ESR related because their total number of pages in print per year is so much greater. Table 3 shows the sizes of various subfields. In this latter table many articles are, of course, included in more than one subfield. We see from the category 'other' that 17% of the 54,030 articles in the CA data set did not appear in any of the subfields. Unfortunately we did not evaluate 'other' for the PA search.

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Over the years the literature in our field exhibited a continual growth which has leveled off during the past couple of decades, as is shown by Fig. 1. The initial growth of the field was slow, with 16, 19 and 28 articles for the abstract years 1948, 1949, and 1950, and about 100 per year toward the end of the 1950's. In the old days we used to wish that there were more papers to read! Then there was a rapid rise during 1959 and 1960 to an average of about 500 per year during 1961-1963. The remainder of the 1960's saw a more gradual increase to the level of 800-900 which was sustained throughout the 1970's. The 1990's brought an additional slow rise followed by a recent decline.

The rapid rise in published research near 1960 was accompanied by a jump in the total physics literature from about 1000 to 2000 citations per year, and paramagnetic resonance rose from 1% to 2½% of this total. The physics literature continued to grow faster than the field of ESR, and is now in excess of 250,000 articles per year, with the ESR articles corresponding to only 0.4% of the total. Similar overall trends occurred in chemistry, and Table 1 shows that in both fields ESR articles have constituted about 0.5% of the literature. In the other disciplines the initial rise to importance occurred at a later date, and the percentage contribution is less.

Our sister field NMR is larger than ESR. In 1990 the ratio of NMR to ESR/EPR articles in Physics Abstracts was 2.00, and in Chemical Abstracts it was 2.82. NMR is still the largest branch of magnetic resonance in medicine, and the ratio of NMR to MRI (magnetic resonance imaging) articles in the 1990 medical literature (Medline) was 1.21.

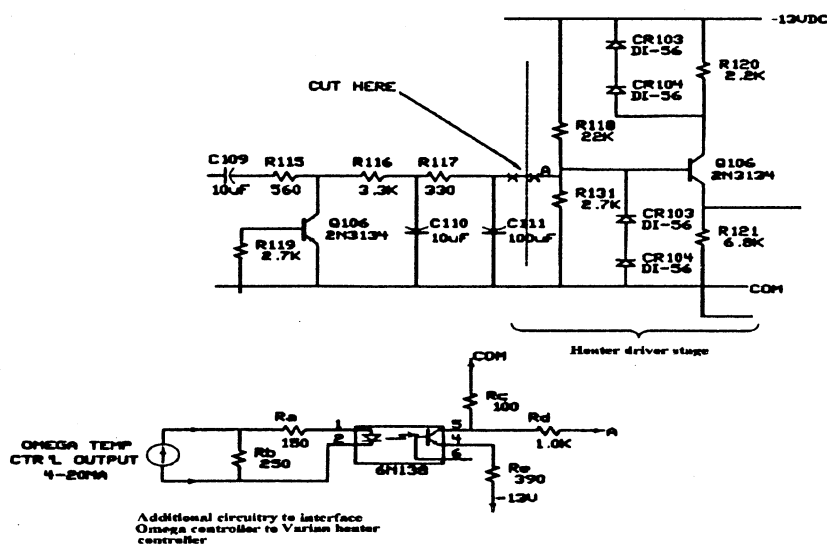
Using commercially available temperature control units such as the OMEGA RTD digital controller (single set point, option F, cat #4201A PC2, ≈ \$320), with an inexpensive thin yet very rugged film calibrated 100 Ohm platinum temperature sensor (cat #1PT 100 R669, ≈ \$37), one can easily modify any Varian VT unit to alleviate all the above problems. Accurate and precise setting and monitoring of temperature to better than  $\pm 0.1^\circ\text{C}$ , from  $-200^\circ$  to  $+200^\circ\text{C}$ , at just below the sample (or at the actual control point with a fair amount of independence from the actual control point) is possible. The response times for these Thin Film RTD detectors are less than 0.2 seconds, providing rapid equilibration and stability to better than  $\pm 0.1$  over the entire range of VT  $\text{N}_2$  flow rates (4-40 SCFH). The thin film detectors themselves may be used over a range of  $-200$  to  $+500^\circ\text{C}$ , and have dimensions small enough so that they may be placed anywhere in the transfer line ( $1.6 \times 5 \times 12$  mm). Usually the sensor is placed about 1 cm above the 21-ohm heater (about 140 cm of heater wire noninductively wound on a spiral-grooved ceramic core), where the sensor is usually placed. Many other smaller and larger standard probes are also available for the same type of RTD controller.

The extremely simple interface consists of an inexpensive optical coupler which uses the 5-20 ma output from the OMEGA sensor/controller to regulate the base of a single transistor in the cascade power amplifier circuitry of the old VT units; see schematic. The old VT control circuitry, the Achilles' heel of the Varian units, is completely bypassed, while optimal use is made of the existing power supply, nitrogen flow meter, and safety circuitry. The power to the heater, however, can still be monitored on the VT front panel meter. The author has

## TIPS & TECHNIQUES

### TIP: Reviving Varian VT Controllers —

Varian variable temperature controllers (VT's) can be found in many EPR and NMR labs. Many of these units unfortunately are collecting dust, or being used for scrap parts. Even most of those still working suffer from non-linearity, i.e. the dial reading bears little if any correlation to the actual sample temperature, long periods of time are required for the temperature to stabilize, the temperature must be checked by an expensive probe anyway, the platinum wire probes are very fragile, and the stability is usually less than  $\pm 0.8^\circ$ . I know of no good and inexpensive commercial replacement for these units, which offer automatic shut-off should too-low or -high  $\text{N}_2$  pressure be detected at the sample cavity, and protection against heater overload.



Schematic. Modification of Varian Temperature Controller.

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modified two units this way. Except for a Zener diode failure in the VT power supply circuitry, both have operated without trouble for a combination of nearly six years. I wish to acknowledge the help and technical assistance of the University of Illinois and University of Washington Chemistry department electronic shops, especially Roy Olund at the latter.

Francesco P. Auteri  
IERC and Dept. Veterinary Clinical Medicine  
University of Illinois, at Urbana/Champaign  
505 S. Mathews, Urbana, IL 61801, USA  
217-333-3776; E-mail: auteri@rlb6000.scs.uiuc.edu

## TECHNICAL INFORMATION— Standard Li-LiF Samples for EPR Measurements

Extremely pure Li-LiF samples consisting of small spherical or variously shaped "massive" metal particles of Li are stable markers of intensity and other EPR characteristics (up to 600 C). Samples with small particles can be used in measurements in the form of "point" grains, samples with large particles are synthesized within transparent LiF crystals, size 2x4x8 mm, which can, if necessary, be broken into pieces. The observed EPR line width is 40 to 100mG depending on sample purity; the deviation of the g-factor from the free electron value is  $\delta g = (-3 \pm 2) \cdot 10^{-5}$ .

These samples can be used in various EPR and NMR investigations — for example, in the analysis of magnetic field inhomogeneity, in the gauging of solenoids and anti-Helmholz coils. Besides, the samples can be useful in education; well-known magnetic resonance effects are to be illustrated (such as Knight's shift, the Overhauser effect, etc). The samples also are useful for calibration and adjustment of EPR-spectrometers and magnetometers. The crystals are being made available to interested colleagues at a pro-forma price of US\$ 650-700 per kit (2 types of

samples for various measurements), with package and marking by agreement. Additional information is available by request. The technical contact for Li-LiF samples is Dr. F.G. Chercasov, Kazan, Phys-Techn. Institut, 420029 Kazan Sibirsky tract, 10/7, Tatarstan (FSU) ☎: 39-30-87, 35-68-46.

The administrative contact is

Dr.O.F.Gubin and Dr.T.R.Hasanov, Republic of Tatarstan Foundation "The Intellect for the XXI Century"

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F.G. Chercasov

## NEWS FROM EPR CENTERS

### FROM the NATIONAL BIOMEDICAL CENTER FOR SPIN TRAPPING AND FREE RADICALS:

We are pleased to report that the National Biomedical Center for Spin Trapping and Free Radicals has accepted delivery of a VG Quattro Ms/Ms mass spectrometer. Spin trapping methodology is being developed to combine EPR with MS in the detection and structure identification of spin adducts. With luck we expect to be ready to work with users in approximately 6 months. Inquiries should be directed to Audrey Winkles by FAX: 405-271-3980.

Edward G. Janzen, Director

### FROM the NATIONAL BIOMEDICAL ESR CENTER in Milwaukee:

**TRAINING AWARDS** — As described more extensively in a previous issue (EPR Newsletter, v.3#4, Winter, 1991, p. 10), some \$500 awards are available to pre- and post-doctoral young investigators to help expenses for 2-week visits to this Center during 1992. The purposes are to provide training in modern EPR methods and to permit the investigators to use the unique facilities of the Center in their on-going research. The faculty and staff of the Center have expertise in the three main areas of EPR research: free radicals, spin labels and transition metals. To apply, send a letter and one-page research plan; student applications should be accompanied by a letter from the graduate faculty advisor. Address applications to Dr. Ching-San Lai, National Biomedical ESR Center, Medical College of Wisconsin, 8701 Watertown Plank Road, Milwaukee, WI 53226, USA; ☎: 414-266-4051.

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*FROM the ILLINOIS EPR RESEARCH CENTER (IERC) in Urbana:*

**TRAINING AWARDS** — We hope to have funding during 1992-3 for a few awards in a traineeship program similar to that offered by the Milwaukee center (see above). Preferably, trainees would take advantage of special facilities or expertise (multifrequency EPR, L- to W-band; S-band pulsed EPR; EPR *in vivo*; EPR imaging; metalloprotein EPR; ENDOR) available at the IERC. Direct inquiries to the IERC c/o Becky Gallivan, Univ. of Illinois, 190MSB/MC-714, 506 S. Mathews Ave., Urbana, IL 61801; ☎: 217-244-1186; FAX: 217-333-8868.

## CONFERENCE REPORT

**CONFERENCE REPORT — THIRD INTERNATIONAL SYMPOSIUM ON ESR DOSIMETRY AND APPLICATIONS.** The Third International Symposium on ESR Dosimetry and Applications was held during October 14-18, 1991, at the National Institute of Standards and Technology (NIST) in Gaithersburg, MD. Conference organizers were William McLaughlin and Marc Desrosiers of NIST, Anne Skinner of Williams College, Williamstown MA, and Harold Swartz of Dartmouth College, president of the International EPR Society, assisted by advisory committees with international membership. Participants from 23 countries heard presentations on the use of ESR to determine dosages from nuclear accidents, to determine the ages of geological materials, to test for irradiation of food, and to learn about recent advances in instrumentation. The keynote address was given by Dr. Motoji Ikeya, originator of this series of symposia, on future directions in EPR dosimetry. Other invited lecturers were Dr. Hal Swartz (on biomedical applications), Dr. Ruth Lyons (on dating applications), Dr. Jacques Raffi (on irradiated food), and Dr. Sandra Eaton (on instrumentation). Over 100 other presentations, roughly evenly divided between talks and posters, completed the very full five-day event. The papers on EPR dating covered a wide range of materials, from quartz grains in sediments to the frozen atmospheres of the outer planets. One can conclude that the principle of applicability is established, and researchers are now concentrating on improving the details. Of concern for terrestrial materials is the difficulty of modelling the dose rate sufficiently closely to allow precise and accurate dating over a time range of as much as one million years. With respect to recent exposures, the work can be separated into the measurement of planned doses (such as food irradiation and therapy) and of accidental doses. Two significant conclusions were drawn with respect to planned dosimetry: that improvements in alanine dosimetry, reducing the



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variation between dosimeters, makes this a serious alternative to Fricke dosimeters; and that testing of irradiated food materials is reliable for some materials (meat bones, for example), but much work must be done on others (especially seafood). In the case of accident dosimetry, the presentations showed that a clearly identifiable signal can be found. The problems lie in quantitation of the dose received, and more sensitive instrumentation, plus a more structured approach to studying accidents, will be essential. Drs. Skinner and Desrosiers are editing the conference proceedings, which are expected to appear shortly in *Applied Radiation and Isotopes*. The organizers acknowledge with much gratitude the financial assistance of the US Defense Nuclear Agency and Department of Energy, Bruker Instruments, Inc., Landauer, Inc., JEOL USA, Inc., Pergamon Press, Micro Device Co., Ltd., Micro-Now Instrument Co., Inc, Medical Advances, Inc., Victoreen, Inc., U.S.EPR, and Scientific Software Services. The Fourth Symposium is expected to be held in October, 1994. For information about it, contact either Dr. Desrosiers at the Center for Radiation Research, NIST, Gaithersburg, MD 20899, or Dr. Skinner (address below).

Submitted by Anne F. Skinner  
Chemistry Department, Williams College  
Williamstown, MA 01267, USA.

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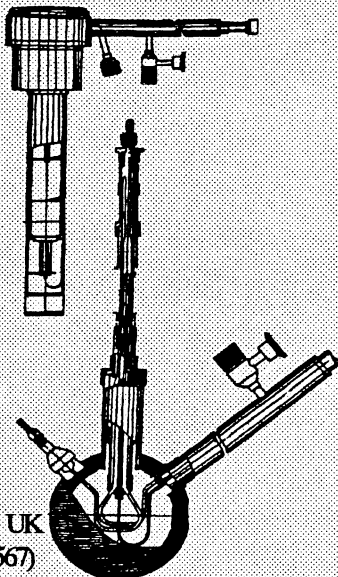
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## NOTICES OF MEETINGS

For information on meetings prior to September 1, 1992,  
see Volume 4, #1 and earlier issues.

**TWENTY-SIXTH CONGRESS AMPÈRE ON  
MAGNETIC RESONANCE, Athens, Greece,  
September 6-12, 1992.** The sponsors of this conference  
are the Institute of Materials Science, NCSR Demokritos  
and the NATO Scientific Affairs Division.

**Program:** A program has been established following  
suggestions of the International Advisory Board. It  
includes a few invited plenary lectures covering general  
aspects and invited symposia lectures on special topics of  
recent developments, new techniques and methods, as  
well as applications in the field of magnetic resonance.  
The program is complemented by short oral contributions  
and poster sessions which were selected from the  
submitted abstracts of contributed papers.

**Scope:** The conference is intended to provide the  
opportunity for discussion of important recent  
experimental and theoretical results in the field of  
magnetic resonance. Its aim is to give the opportunity to  
scientists to present their work and discuss the results

with leading scientists working at the frontier of the  
field.

Two plenary lectures daily are followed by 2-4  
symposia in parallel sessions, followed in turn by poster  
sessions in the evening. The preliminary list of plenary  
speakers included R. Ernst (Nobel Laureate, Zürich), P.  
Mansfield (Nottingham), M. Mehring (Stuttgart), A.K.  
Muller (Zürich), A. Pines (Berkeley), C.P. Slichter  
(Urbana), and H.W. Spiess (Mainz).

Symposia were planned on several topics, including  
these: imaging (NMR, NQR, ESR), microimaging, new  
techniques and applications, optical detection, chaotic  
and fractal phenomena, ferromagnetic, paramagnetic,  
amorphous, disordered, and porous systems, liquid  
crystals, polymers, superconductivity, biological systems,  
glasses, phase transitions in ordered and partially ordered  
systems, and tunneling effects. **Contact:**

"CONGRESS AMPÈRE", Dr. F. Milin  
NCSR Demokritos, Ag. Paraskevi-Attikis  
153 10 Attiki, GREECE.

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(Internet) or milia@grathdem.Bitnet

**SECOND EUROPEAN MEETING ON ESR  
APPLICATIONS IN ORGANIC AND BIOORGANIC  
MATERIALS, Lyon, FRANCE, November 5-6, 1992.**  
*Scope and Topics of the Meeting:*

Following the 1990 ESR meeting on organic and  
bioorganic materials, the GARPE (Groupe d'Application  
de la Resonance Paramagnetique Electronique) is  
organizing a second European Symposium in Lyon on  
November 5 and 6, 1992. The intent of this meeting is  
to bring together industrial and academic researchers  
working in different fields in order to promote the  
practical applications of ESR spectroscopy and its  
derivated methods. Some theoretical and new aspects of  
this technique will also be discussed (high frequency,  
imaging, pulsed techniques). The elaboration and  
transformation of industrial products with such a variety  
of applications require a better understanding of basic  
phenomena in the range of ESR spectroscopy. Topics  
include ESR spectroscopy of paramagnetic species as  
well as spin trapping, spin probe and spin labelling  
methods in fields such as medical, biophysics, polymeric  
materials, ionized foods, diffusion phenomena, cataly-  
sis...

The program will include plenary lectures as well as  
oral (25 minutes including discussion) or poster  
presentations. Scheduled lectures: L.C. Brunel  
(France), M. Brustolon (Italy), A. Rassat (France), K.A.

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McLauchlan (UK), P. Tordo (France), and G. Martini (Italy).

**FREE RADICALS AND ANTI-ISCHAEMIC AGENTS, December 16-18, 1992, SFRR Europe/Biochemical Society Joint Meeting, London, United Kingdom.** For more information, contact Dr. Rice-Evans, UMDS, Lambeth Palace Road, London SE17EH, United Kingdom. ☎: 071-928-9292.

**INTERNATIONAL CONFERENCE ON CRITICAL ASPECTS OF FREE RADICALS IN CHEMISTRY, BIOCHEMISTRY AND MEDICINE, Vienna, AUSTRIA, February 14-17, 1993.** The organizers are Hans Nohl, president, (Vienna) and Hermann Esterbauer, chairman (Graz).

**Aims of the Conference:** The constantly increasing numbers of reports on free radicals makes it increasingly difficult to evaluate the significance and authenticity of scientific contributions to this field. Controversial findings and interpretations, although stimulating the promotion of scientific knowledge, make it necessary to critically appreciate experimental research conditions, model systems applied, and the biological relevance of results presented. Thus it seems compelling to concern scientists working in the free radical field with critical views of their research work. The aim of the Conference in Vienna is therefore a critical up-to-date survey to elaborate facts and fancies in free radical research.

**Scientific Program:** The scientific program will include the following topics, which are first introduced by the indicated overview speakers, followed by several specific lectures by invited speakers. All details will be announced in the second circular. Posters can be shown throughout the Conference; scheduled Poster Sessions will be held on Sunday, Monday and Tuesday. Opening lecture: Chemistry of free Radicals (R.L. Wilson, UK). Topics include Detection of free radicals in biological systems (E.F. Elstner, Germany), Biological sources of free radicals (B. Halliwell, UK), Consequences of oxidative stress (T.F. Slater, UK), Facts and fancy of free radicals in the pathogenesis of disease (M.H. Schoenberg, Germany), Role of natural antioxidants in treatment and prevention of disorders induced by oxidative stress (H. Sies, Germany; L. Packer, USA). There will be a workshop on smog (W.A. Pryor, USA).

**Second Circular:** To be mailed in June 1992. It will specify the details of the scientific program and include forms for final registration, information for the preparation of abstracts as well as hotel reservation forms. If interested in the second circular or participating in the Conference, immediately contact

**Conference Secretariat and Registration, Vienna Medical Academy of Postgraduate Medical Education and Research, Alser Str. 4, A-1090 Vienna, AUSTRIA**

☎: +43(1) 42 13 83-0, 84-0 or 65-0; Fax: +43(1) 42 13 83 23

Contacts for the Scientific Program are:

Prof. H. Nohl, Institute of Pharmacology and Toxicology, Veterinary University Vienna, Linke Bahngasse 11, A-1030 Vienna, AUSTRIA

☎: +43 1 711 55-450; Fax: +43 1 713 68 95

or Prof. H. Esterbauer, Institute of Biochemistry, University of Graz, Halbarthgasse 5, A-8010 Graz, AUSTRIA

☎: +43 316 31 330; Fax: +43 (316) 38 40 92

**EMARDIS-93 (THIRD INTERNATIONAL WORKSHOP ON ELECTRON MAGNETIC RESONANCE OF DISORDERED SYSTEMS), to be held near Sofia, BULGARIA, June, 1993.** The exact place and dates will be announced in the first circular in July, 1992. The aim is to cover all aspects of recent development in the theory, methodology, instrumentation, and experiments of electron magnetic resonance (EPR, ENDOR, ESE) spectroscopy of disordered systems in lectures, posters, and round-table discussions. Official language: English. Current plans are to start with dinner on a Monday and finish Friday after breakfast. On the same day, starting with dinner, the Q-EPR Expert Meeting (see next announcement) will commence. The Q-EPR meeting will close on Monday after breakfast.

Short abstracts of the EMARDIS-93 papers will be available at the meeting, and full papers based on the invited lectures will be published in a Proceedings about the end of 1993.

To receive the first circular and inquire about participation and preliminary registration, please contact one of the following:

(a) N. D. Yordanov (Convener) or M. Ivanova (Sci. Sec'y, Q-EPR), Institute of Kinetics and Catalysis, Bulgarian Academy of Sciences, 1113 Sofia, BULGARIA. Telex: 22729 echban. FAX: (+3592) 756-116 or 720-038; ☎: 713-2546 or 713-3917. or (b) G. Gochev (Sci. Sec'y, EMARDIS), Department of Chemistry, Sofia University, 1 James Bourchier ave., 1126 Sofia, BULGARIA. ☎: (+3592) 62-561 ext. 223.

**FIRST INTERNATIONAL EXPERT MEETING ON QUANTITATIVE EPR (Q-EPR), to be held near Sofia, Bulgaria in June, 1993 immediately following the**

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EMARDIS-93 workshop; see the announcement immediately above.

**2nd FAR EASTERN CONFERENCE ON MEDICAL AND BIOLOGICAL ENGINEERING 1993, Beijing, CHINA, August 15-17, 1993.** The purpose of this meeting is to exchange information and encourage cooperative development of medical and biological engineering in the Far East and the other parts of the world. The theme of this conference is to look at high level science and technology, especially to accelerate the progress of medical and biological engineering and to promote medical care. Deadline for submission of abstracts is November 30, 1992. For more information, contact Secretariat of 2nd FECMBE, c/o Chinese Society for Biomedical Engineering, 5 Dong Dan San Tiao, Beijing 100005, China.

**4TH ANNUAL INTERNATIONAL SYMPOSIUM ON SPIN TRAPPING -- APPLICATIONS IN CHEMISTRY, BIOLOGY AND MEDICINE, Oklahoma Medical Research Foundation, Oklahoma City, Oklahoma, USA, October 10-14, 1993.** The 4th International Symposium on Spin Trapping will be held at the Oklahoma Medical Research Foundation in Oklahoma City, Oklahoma, USA on Sunday to Thursday, October 10-14, 1993. An optional excursion with a post mini-symposium is planned for Thursday to Sunday, October 14-17. Spin trapping is defined as any radical addition reaction (trapping) which produces an addition product (adduct) with the radical group attached. The structure of the adduct can be determined by any means, e.g. EPR, MS, NMR, etc. Hydrogen atom abstraction reactions are not considered spin trapping. The local organizing committee is as follows: Edward G. Janzen (host); Coit M. DuBose, Robert A. Floyd, Yashige Kotake, Paul B. McCay, J. Lee Poyer, Lester A. Reinke. Secretary, Mrs. Audrey Winkles.

Please address inquiries to the

Molecular Toxicology Research Program  
Oklahoma Medical Research Foundation  
825 N.E. 13th St.

Oklahoma City, Oklahoma 73104 USA.

☎: 405-271-7570; FAX: 405-271-3980.

**WORKSHOP ON *IN VIVO* EPR AND EPR STUDIES OF VIABLE BIOLOGICAL SYSTEMS** to be held October 18-21, 1993 at the Dartmouth Medical School, Hanover, New Hampshire, USA. Harold Swartz, chair of organizing committee. Sponsored by the Illinois EPR Research Center (IERC) and held at the IERC Dartmouth site. To be coordinated with the Fourth Annual International Symposium on Spin Trapping. More complete details on this workshop will appear in a later issue. Earlier inquiries should be addressed to Dr. Swartz at the address listed in the next item on this page.

## POSITIONS OPEN

**POSTDOCTORAL/RESEARCH ASSOCIATE.** One or two positions available in projects using EPR spectroscopy in viable biological systems *in vitro* and *in vivo*. Required: background in EPR spectroscopy and/or working with viable cells and animals.

Send C.V. and three letters of reference to:

Dr. Harold Swartz, Dartmouth Medical School  
308 Strassenburgh Hall, HB7250  
Hanover, NH 03755-3863, USA

☎: 603-650-1955; FAX 603-650-1255

E-Mail: Harold.Swartz@Dartmouth.edu

**GRADUATE RESEARCH ASSISTANTSHIP (OR POSSIBLY POSTDOCTORAL FELLOWSHIP)** soon will be available to study mechanisms of NMR relaxation enhancement by paramagnetic MRI contrast agents. The studies involve chemistry, theory, multifrequency EPR (including ENDOR and pulsed EPR), and NMR (including relaxometry and MRI).

Equal opportunity employer; minority applications are encouraged.

Send transcript and two letters of recommendation to:

Prof. R. B. Clarkson  
257 LAC, University of Illinois  
1008 W. Hazelwood Drive  
Urbana, IL 61801, USA

☎: 217-244-1375; FAX: 217-244-3186

E-mail: r-clarkson@uiuc.edu

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## SITUATIONS WANTED

**FREE RADICAL CHEMIST, 42, Cand. Chem. Sci. (Moscow State University, Russia) seeks new challenging research position. 15 yrs university research/teaching experience in radiation chemistry, photochemistry, physical-organic chemistry, use of EPR and EPR Spin Trapping in chemistry and biology. Hands-on experience in EPR and Pulse Radiolysis. Interests: applying EPR, spin trapping, and time-resolved techniques to investigate structures and kinetics of short-lived free-radical intermediates; training graduate students; developing an independent interdisciplinary research program in free radical chemistry. Available now. Presently working in Germany. Contact Dr. V. Zubarev; FAX (international): 49-2461-612535**

Valentin E. Zubarev, ICH-1  
Institut für Chemie  
Forschungszentrum Jülich, GmbH  
Postfach 1913, D-5170, FRG

## NOTICE

### POSSIBLE SUPPORT

Biomedical Research Exchanges. These are made with Austria and Bulgaria for short-term (2 to 12 weeks) and long-term (3 to 6 months) exchanges. The programs are limited to collaboration in the biomedical sciences. The award includes: (1) cost of lodging; (2) living allowance; (3) international and in-country travel costs; and (4) health insurance for participants and accompanying dependents. Similar provisions are made for scientists from Austria and Bulgaria.

Further details may be obtained from the office listed below.

International Coordination and Liaison Branch  
Building 31, Room B2C11  
Fogarty International Center  
Bethesda, MD 20892

☎: (301) 496-4784  
FAX: (301) 480-3414

International Neurosciences Fellowship Program. The International Neurosciences Fellowship Program provides opportunities for junior or midcareer health professionals and scientists in the neurosciences to enhance their research skills in a laboratory in the United States.

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EPR spectrometers, components, accessories, and microwave equipment. Model 8320 Magnet Field Controller for replacing older controllers, *i.e.* Varian Mark I & II and other types. Includes keyboard or controlled by external computer. Address: 8260 N. Elmwood, PO Box 1488, Skokie, IL 60076, USA., ☎: 708-677-4700. FAX: 708-677-0394

Emphasis is on research and research training in epilepsy and stroke. Preference is given to applicants from developing countries who are currently working or planning careers in health agencies or health-profession schools.

Inquiries about this fellowship should be directed to:

International Research and Awards Branch  
International Neurosciences Fellowship Program  
Building 31, Room B2C39  
Fogarty International Center  
Bethesda, MD 20892

☎: (301) 496-1653  
FAX: (301) 402-0779

International Research Fellowship Program. The International Research Fellowship Program is for foreign scientists to extend their research experiences in U.S. laboratories. Applicants must have 10 years or less postdoctoral experience; be invited by a scientist employed in a U.S. nonprofit institution; be selected by the Nominating Committee in their country; have assurance from a nonprofit institution in the home country of a position after completion of the fellowship; and be proficient in English. International Research Fellowships are awarded for 12 to 24 months. More than 60 countries participate in this program.

Inquiries about all Bilateral Exchange Programs and their application receipt dates should be directed to:

International Coordination and Liaison Branch  
Building 31, Room B2C11  
Fogarty International Center  
Bethesda, MD 20892

☎: 301-496-4784  
Fax: 301-480-3414

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## EQUIPMENT & SUPPLIES EXCHANGE

### WANTED: OLD OR JUNKED VARIAN E-3.

Urgently needed! We want an old or junked Varian E-3 EPR spectrometer to be used for parts for one that is barely running. If you can provide one, or if you can suggest how we can find one, please contact:

H. D. Gesser

Dept. of Chemistry, U. of Manitoba  
Winnipeg, CANADA R3T 2N2

☎: 204-474-9893. FAX: 204-275-0905

### WANTED: EPR SPECTROMETER.

We are in need of a Varian E series EPR spectrometer, preferably an E-4, in good condition. A klystron for an E-3 is also useful. Contact:

Mark McNamee

Department of Biochemistry and Biophysics  
University of California at Davis  
Davis, CA, 95616, USA

☎: 916-752-6418; FAX: 916-752-3085.

### WANTED: VARIAN EPR UNIT.

I already have the magnet and power supply.  
Contact:

Tim Usher

Department of Physics  
California State University  
5500 University Parkway

San Bernardino, CA 92407-2397

☎: 714-880-5410; Fax: 714-880-7005

Email: tusher@wiley.csusb.edu

### AVAILABLE: VARIAN V 4500 MODULES

Modules for the Varian V4502 EPR spectrometer are available from G. R. or S. S. Eaton at the University of Denver.

E-Mail: GEATON@DUCAIR.BITNET.

### WANTED: USED VARIAN EPR SPECTROMETER.

We are looking for a used Varian E-line Century series EPR spectrometer (in working condition, please).

While we would prefer an E-104, we will consider another model. Contact:

S. Tsuyoshi Ohnishi

Philadelphia Biomedical Research Institute  
100 Ross and Royal Roads  
King of Prussia, PA 19406, USA

☎: 215-962-0615. FAX: 215-254-9332

### AVAILABLE: BOXCAR AVERAGER

An inexpensive boxcar averager designed for use in electron spin echo (ESE) spectrometers is available from the University of Denver. At slow repetition rates it gives about two orders of magnitude better S/N than the well-known PAR 162/164 boxcar.

Contact Richard Quine at the University of Denver, Denver, CO (☎: 303-871-2419).

### WANTED: PAR BOXCAR-AVERAGER.

We are seeking a dual-channel boxcar-averager, PAR Model 162. Please contact:

Dr. Günter Grampp

Institute of Physical Chemistry  
University of Erlangen  
Egerlandstraße 3  
D-852 ERLANGEN, GERMANY

### AVAILABLE: O<sub>2</sub>-SENSITIVE FUSINITE SAMPLES.

As described in a previous Newsletter (vol. 3, #1, pp. 13-14, 1/91), the Illinois EPR Research Center will provide, at cost (\$100) 1-g samples of fusinite for EPR oximetry. The EPR linewidth of this material is extremely sensitive to oxygen pressure or concentration. These samples are milled and screened to uniform maximum particle size and provided with some documentation.

To order or inquire, contact:

Becky Gallivan, IERC, University of Illinois  
(Address information on p. 1 of this issue)

### WANTED: USED VARIAN EPR X-BAND CAVITY.

Can anyone sell us a Varian cavity, either TE<sub>102</sub> or TM<sub>011</sub> (preferred), to fit an E-line or Century series EPR spectrometer? Many Varian systems have been scrapped, but people usually keep their cavities, if only

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for sentimental reasons. We would like to purchase your old cavity. We will have it reconditioned, if necessary - as these are no longer sold by Varian.

If you can help, please contact:

Professor Lawrence J. Berliner  
Department of Chemistry, The Ohio State University  
120 West 18th Ave.  
Columbus, OH 43210-1173, USA.

☎: 614-292-0134; E-Mail (Internet):  
lberline@magnus.acs.ohio-state.edu

## AVAILABLE: VARIAN 620L BOARDS

A full set of boards for the Varian 620L computer is available from Sandra or Gareth Eaton at the University of Denver (BITNET SEATON@DUCAIR).

## NEEDED: SURPLUS EQUIPMENT, BOOKS, etc.

My earlier Letter to the Editor (vol. 3, #1, January, 1991) explains how our institute has become sadly depleted in equipment and supplies in recent years. Can anyone help with a gift of surplus equipment or parts or of surplus books or journals in EPR and NMR or in closely related areas (physical chemistry).

Dr. Horia Caldararu  
Romanian Academy, Institute of Physical Chemistry  
Splaiul Independentei 202  
77208 Bucharest, ROMANIA.

## AVAILABLE: VARIAN FIELD SCAN CONTROLLER CARDS

Any Varian magnetic field controller can be modified to permit control of the magnetic field by a computer. A fully documented printed circuit card and controller

modifications is available from the University of Denver. Contact Richard Quine (303-871-2419).

## TEMPO DERIVATIVES FREE!

We have small amounts — 50 to 200 mg each — of unique derivatives of TEMPO to give away: 4-nitro-, 4,4-dinitro-, 4-chlor-4-nitro-, 4-brom-4-nitro-, 4-iod-4-nitro-, 4-hydroxy-4-butyl-, 4-hydroxy-4-hexyl-. Also, there are some amounts of corresponding nonoxidized amino compounds containing the 4-nitro group. To request these samples, contact:

Anatol E. Myshkin, N.N. Semenov Institute of  
Chemical Physics of the Russian Academy of  
Sciences  
Kosygin str., 4, 117977 Moscow V-334, RUSSIA

## CORRECTIONS & ADDITIONS

*Readers: Please let us know of significant misprints, errors, or omissions which occur in any issue. From time to time, this section will appear with corrections. Recently, the following have come to our attention:*

In the previous issue, a syllable was lost from the name of Dr. B. Kalyanaraman (Med. Coll. of Wisconsin).

The correct E-mail address for Dr. Richard Cammack (Univ. of London; Chair, IES Software Committee) is UDBC033@hazel.cc.kcl.ac.uk

Corrected E-mail address for Dr. Lawrence Berliner (Ohio State Univ.; coChair, IES Awards Committee): lberline@magnus.acs.ohio-state.edu

Contact information for Dr. C. Rudowicz (City Polytechnic of Hong Kong): ☎: 852-788-7830; FAX 852-788-7787; E-mail: APCESLAW@CPHKVX.BITNET

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JAPAN: SUMITOMO SPECIAL METALS Co., Ltd. Tokyo Head Office: (Tel) 03-3296-3070; (Fax) 03-3233-3649





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This publication is the official newsletter of the INTERNATIONAL EPR(ESR) SOCIETY. It is supported by the Society, by corporate and other donors, and by three national Centers for EPR/ESR spectroscopy in the USA. These Centers are sponsored by the Division of Research Resources, U.S. National Institutes of Health:

**National Biomedical ESR Center**, Prof. James S. Hyde, Director. Medical College of Wisconsin, MACC Fund Research Center Building, 8701 Watertown Plank Road, Milwaukee, Wisconsin 53226, USA. ☎ 414-266-4000. FAX: 414-266-4007. E-Mail: felixc@uvax01.biostat.mcw.edu

**Biotechnology Resource in Pulsed EPR Spectroscopy**, Prof. Jack Peisach, Director. Albert Einstein College of Medicine, Department of Molecular Pharmacology, 1300 Morris Park Avenue, Bronx, New York 10461, USA. ☎ 212-430-2175. FAX: 212-829-8705. E-mail: peisach@aecom.yu.edu

**Illinois EPR Research Center (IERC)**, Prof. R. Linn Belford, Director; Prof. Harold M. Swartz, Co-Director; Prof. Robert B. Clarkson, Associate Director; Prof. Peter G. Debrunner, co-Principal Investigator, other senior staff: Prof. Mark J. Nilges, Dr. Alex Smimov, Laboratory Manager, and Dr. Tadeusz Walczak; University of Illinois at Urbana-Champaign, 190 Medical Sciences Building, 506 South Mathews Ave., Urbana, Illinois, 61801, USA. ☎ 217-244-1186. FAX: 217-333-8868. E-mail: ierc@uiucvmd.bitnet, r-belford@uiuc.edu, or belford@rlb6000.scs.uiuc.edu.

(IERC also operates a satellite site for EPR *in vivo* at Dartmouth University in Hanover, New Hampshire; ☎ 603-650-1955; FAX 1225. E-mail: harold.swartz@dartmouth.edu)

*These Centers, which were described in our first issue (Volume 1, #1), cooperate to facilitate research requiring EPR-related techniques. Prospective collaborative or service users may contact the staff at any of the Centers.*

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**HOW TO REACH US** — To communicate about the EPR Newsletter or submit material, contact R. Linn Belford, Editor or Becky Gallivan, Editorial Assistant, at IERC (address above).

## HYDE WINS THE SOCIETY'S GOLD MEDAL AWARD —

In August it was publicly announced that Professor James S. Hyde (Medical College of Wisconsin in Milwaukee) has been selected to receive the second annual Gold Medal Award of the International EPR(ESR) Society; see the Society reports (below). Congratulations, Jim! He will be presented with the award, give the Gold Medal Award address, and take part in other events in his honor next July at the Sixteenth International EPR Symposium in Denver.

## BLEANEY NAMED TO RECEIVE THE ZAVOISKY AWARD-

The Kazan Physical-Technical Institute of the Academy of Sciences, USSR, is pleased to announce that the International Zavoisky Award Committee has selected Prof. Bruce Bleaney (Oxford University) as the winner of the 1992 Zavoisky Award. This is the second Zavoisky Award to be given. Congratulations!

## PUBLICATION AND DISTRIBUTION

*This is a members' issue. EPR Newsletters are published quarterly for the members (ca. 1000) of the International EPR (ESR) Society. One issue (which was the winter issue in 1991) each year is public, which the (ca. 2000) nonmembers on our mailing list also receive. The publication date indicates approximately when an issue goes to press. To keep costs reasonable for the Society, much of the distribution is by volunteer effort (including some by JEOL and a great deal by Bruker, USA as part of their support for the Society). Some distribution must be by bulk mail, which is cost-effective but rather slow. Dated material such as meeting notices thus should be sent to the editor as early as possible to insure that it reaches the readers well before the critical dates.*

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## JEOL

EPR

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## ◆ IES AFFAIRS ◆ ANNOUNCEMENTS AND REPORTS FROM THE INTERNATIONAL EPR SOCIETY

### REPORT OF THE IES SECRETARY:

#### Minutes of meeting in Denver

A brief business meeting of the International EPR Society was held at the 15th International EPR Symposium in Denver, Monday, August 3, 1992 following the technical presentations of the afternoon session of the Symposium. About 40 people attended the business meeting. To emphasize that the Denver meeting is not the "official" meeting of the Society, no formal votes were taken during this meeting.

The President of the Society, Professor Harold Swartz, reported on developments during the past year. There was enthusiastic reception of the report that the first Gold Medal of the Society was awarded to Professor George Feher, and that the second Gold Medal is to be awarded to Professor James Hyde. Professor Feher made his award address earlier in the day, and was honored at a dinner following the business meeting. Professor Hyde will be honored with a technical

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symposium and a dinner at the 16th International EPR Symposium in Denver in 1993.

The Society has about 1000 members, from about 40 countries (the number of countries changes faster than the number of members). The Society is attempting to be supportive of colleagues in eastern Europe and the former Soviet Union (FSU): (a) dues are collected in local currencies, and those dues payments are to be spent totally within the country from which they were collected, and (b) a special grant fund of \$500 has been budgeted to support travel to scientific meetings within the FSU. Travel awards of \$10 to \$15 each are anticipated.

The Society wants to recognize a wide range of contributions in many areas of EPR and in many countries. The Awards Committee is sensitive to the fact that the first two Awards have been to scientists from the United States (note that the Awards Committee has only one member from the US), and actively seeks to ensure proper international representation with the Society's awards.

Negotiations are proceeding with other established meetings in EPR to conduct business meetings of the Society at them as well as in Denver each year.

It is time to elect a new slate of officers. It is important that the next officers not be from the United States. The Nominating Committee (Co-Chairs: Dr. Arthur Schweiger, Lab. für Physikalische Chemie, Eidgenössische Techn. Hochschule, ETH Zentrum Universität 22, Zürich CH8092, SWITZERLAND; ☎: 41-256-4362; E-mail: schweiger@c2heth5a.bitnet; FAX: 41-252-3402 and Prof. Piotr Fajer, Florida State University, Biological Sciences, IMB-502, Tallahassee, FL, 32306-3015, USA; ☎: 904-644-7632; E-mail: fajer@fsui.Cc.Fsu.Edu; FAX: 904-561-1406) seeks input from the members as the slate of nominees is put together. There is sentiment that the next officers should be from Europe, and then the next set should be from the Pacific Rim, but the Committee is eager to have as much input into the decisions as possible.

Professor Sandra Eaton presented the report of the Treasurer, which is summarized separately in this Newsletter. Most of the expenses of the Society have been for the Newsletter, but the Awards of the Society will be a larger part of the budget in the future, as this part of the program reaches a steady-state. It was noted that Bruker Instruments has been making a large contribution to the Society by mailing the Newsletter. Although this contribution does not show up in the financial balance sheet of the Society, it is a larger

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financial contribution than that of any other corporate member. JEOL also helps with mailings.

The minutes of the 1991 meeting were published in volume 3 number 3 of the EPR Newsletter. Secretary Gareth Eaton reported that the recent ballot decisively elected Professor Karl Hausser Vice President of the Society. Members found it convenient to send ballots to the Secretary, often along with dues payments, and the Secretary counted those ballots in violation of the details of the Constitution. The election procedures in the Constitution have many built-in safeguards which seem irrelevant to the present operation of the Society.

Professor Larry Berliner reported for the Awards Committee that there will be four types of awards:

- (a) **Gold Medal:** The Gold Medal, recognizing benchmark contributions to EPR spectroscopy as a whole; one award per year;
- (b) **Silver Medals:** Three Silver Medals each year, one each in the general areas of Chemistry, Physics, and Biology and Medicine;
- (c) **Young Investigator Awards:** Three Young Investigator awards each year, in the same fields as the Silver Medals; "young" is defined as less than 7 years since the Ph.D. degree.
- (d) **Student Travel Awards:** Applications for student travel awards are acted upon by the Awards Committee as described in most issues of the EPR Newsletter.

The Awards Committee will probably set up sub-committees to inform it in the topical areas to avoid a narrow view. The Committee solicits nominations for all awards. Nominations for the Young Investigator awards should be based on a single paper in which the nominee made an important contribution to the development or application of EPR.

Nine student travel awards were made this year. There was a preference in the awards toward people from soft currency countries. These are separately

reported in the Newsletter as they are made during the year. President Swartz attended two of the meetings and made the awards to the students.

Professor Richard Cammack reported for the Computer Software Committee that there would be a general discussion of relevant topics the next day. This well-attended meeting is reported in the "Computer Corner" in this Newsletter.

Newsletter Editor Professor Linn Belford distributed a preprint of Volume 4 Number 2 to attendees. He solicited contributions to the Newsletter from anyone with information to share, in all areas of EPR.

Minutes Prepared by Gareth R. Eaton, Secretary

## NOTES FROM A MEETING OF THE OFFICERS OF THE SOCIETY

During the 15th International EPR Symposium in Denver, those officers in attendance met informally to discuss issues facing the Society. These notes inform the members of these discussions.

Primary concern expressed was with ensuring a strong set of officers to continue the program of the Society. It was agreed that the experience so far strongly supports the idea that the Secretary and Treasurer should be from the same geographic area as the President, though not necessarily from the same country. Ease of communication is the key. Some consideration might be given to maintaining a regional treasurer in the US after election of a new Treasurer from another country, because of the difficulty of dealing with non-US currency in the US. Our banks often charge more than the annual dues to exchange between currencies.

The upcoming 50th anniversary of the discovery of EPR could be a time to highlight the importance of EPR. Ideas for celebrations in several countries were discussed. The Eatons have begun communication with Kev Salikhov in Kazan concerning joint celebrations in Kazan and Denver, and Hal Swartz will urge leaders of other EPR Societies and established meetings to

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contribute to an international celebration of EPR in 1994. This may be an important series of events for which the Society should consider providing some financial support.

Report prepared by Gareth R. Eaton

## ANNUAL REPORT OF THE IES TREASURER for the Period January 1, 1991 to December 30, 1991:

(This report includes information from the mid-year report submitted July 27, 1991)

### I. Income

A. Membership Dues	\$4905.00
B. Corporate Support* (CRC Press, JEOL, Medical Advances, Micro-Now, Norell, Wilmad Glass, Scientific Software, and Sumitomo Specialty Metals)	\$4305.00
C. Interest on Bank Account	\$510.16
D. Miscellaneous	\$190.00

Total income = \$9955.16

### II. Expenses

A. Postage for Treasurer's Office	\$87.69
B. Expenses at Univ. of Illinois for EPR Newsletter and office operations supplies	\$7839.21
hourly help	\$276.45
postage/shipping	\$4258.05
printing/copying	\$1986.46
C. Incorporation and tax exempt status	\$1318.25
D. Student Travel Awards	\$820.47
E. Miscellaneous	\$500.00
	\$11.95

Total expenses = \$9259.32

### Account Balances:

On January 1, 1991: \$11,273.68  
On December 30, 1991: \$11,969.52

\*Bruker also provided a large contribution by assisting with substantial mailing costs for the Newsletter.

Submitted by Sandra S. Eaton, IES Treasurer

## IES TREASURER'S MID-YEAR REPORT for the Period January 1, 1992 to July 31, 1992:

### I. Income

A. Membership Dues	\$8027.82
B. Corporate Support* (JEOL, Norell, Wilmad Glass, Oxford Instruments)	\$1800.00
C. Interest on Bank Account	\$176.40

Total income = \$10,004.22

### II. Expenses

A. Postage for Treasurer's Office	\$20.00
B. Expenses at Univ. of Illinois for EPR newsletter and office operations supplies	\$6319.38
hourly help	\$128.33
postage/shipping	\$2469.77
printing/copying	\$1092.55
C. IRS filing	\$2628.73
D. Society Award and Student travel awards	\$159.91
	\$1500.00

Total expenses = \$7999.29

### Account Balances:

On January 1, 1992: \$11,969.52  
On July 31, 1992: \$13,974.45

\*Bruker also provided a large contribution by assisting with substantial mailing costs for the Newsletter.

Submitted by Sandra S. Eaton, IES Treasurer

**DUES MAY BE PAID IN POUNDS STERLING:**  
For the convenience of members in the United Kingdom and western Europe, IES dues for full members have been fixed at the yearly rate of fifteen pounds sterling (UK£15).

Please send payments in pounds to Prof. David Greenslade, University of Essex, Dept. of Chemistry, Colchester CO4 3SQ, UK.

**CORPORATE MEMBERS:** The IES now has eleven corporate members; see their display boxes in this issue.

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## EPR CONFERENCE TRAVEL GRANTS FOR STUDENTS - CALL FOR APPLICATIONS:

The International EPR Society provides travel grants to students (including postdoctoral student members of the Society) to help defray their expenses in traveling a long distance to present EPR-related work at an appropriate conference (see "Notices of Meetings" in each Newsletter). A student may apply for an award of up to \$250(US) in a brief (1-2 page) letter with (1) some information about him/herself, (2) reasons for wishing to attend and present work at the particular meeting specified, and (3) the endorsement of the student's research advisor. The Awards Committee makes all decisions and announces results to all applicants. Send applications to Prof. L. J. Berliner, co-Chair, IES Awards Committee, Dept. of Chemistry, The Ohio State University, 120 West 18th Ave., Columbus, OH 43210-1173, USA. ☎: 614-292-0134; E-Mail: berliner@livers.mps.ohio-state.edu

**"APPLIED MAGNETIC RESONANCE" – SPECIAL OFFER FOR IES MEMBERS:** An arrangement has been made for members of the International EPR(ESR) Society to subscribe to the journal "APPLIED MAGNETIC RESONANCE" (K.M. Salikhov, Ed.) for a very small fraction of the public subscription cost. For example, in the USA the IES rate will be \$92 (plus postage). Orders and inquiries must go directly to Springer-Verlag Wien, Sachsenplatz 4-6, A-1200 Wien, AUSTRIA (Fax x43/222/330 24 26). Payment may be made by check or standard credit card.

**SUPPORT OF TRAVEL TO MEETINGS INSIDE EASTERN EUROPEAN COUNTRIES:** As first announced in the previous issue, the International EPR Society has established a temporary system of small grants to facilitate travel to EPR related meetings within those Eastern European countries which recently have suffered a calamitous decline in research support. The normal policy of the Society is to provide travel stipends only to students and very junior scientists. However, during this emergency period, these small travel grants are available to all scientists, junior and senior, in Eastern Europe. Small hard currency grants of \$10 to \$25 each should be enough to make travel to meetings possible in these countries. The IES funds for this are administered and distributed by a committee chaired by Yakov Lebedev (Institute of Chemical Physics, Russian Academy of Sciences, Kosygin Str.4, 117977 Moscow

V-334, Russia). To apply for these travel awards, write directly to Professor Lebedev, providing details on the meeting to be attended and the amount of hard currency required for the travel expenses.

The program will be reviewed next year to determine whether an extension is needed and justified.

## FROM THE EDITOR

A warm welcome to GMW Associates, the newest corporate member of the International EPR(ESR) Society. The Society offers supporting companies four classes of corporate membership carrying different fees and privileges, (as described in the EPR Newsletter, Vol. 2 #3, October, 1990, p. 7 ).

R. Linn Belford

## LETTER TO THE EDITOR

Sir:

I was happy to see the words "spin label" and "spin-trapping" included in the new vocabulary of science: see Academic Press Dictionary of Science and Technology edited by Christopher Morris, Academic Press, 1992, pages 2058 and 2059.

Thus:

spin label (Physical Chemistry), a molecule in which an atom or group of atoms exhibit an electron spin that causes the atoms to bond to another molecule and that can be detected by spectroscopy.

spin-trapping (Physical Chemistry), the detection of an unstable free radical, usually by electron spin resonance spectroscopy, by reacting it with a compound that forms a more stable radical.

Ironically nitroxide, nitroxyl or aminoxyl are not included in the dictionary!

I am happy with the definition of "spin-trapping" but one could quibble over the meaning implied for "spin label."

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The question of hyphenation is also interesting. A long time ago, Professor Carl R. Johnson (Wayne State, Chemistry) wrote to me asking why "spin trap" was two words when "mousetrap" and "flytrap" were each one word and "bear-trap" was hyphenated. Since I didn't know I wrote a letter to the chairperson of the English Department at the University of Guelph asking for enlightenment. Eventually a letter came back from a faculty member saying that it is known from the history of the English language that when a new phrase is coined it usually comes out as separate words. Then as the term is more familiar it may become hyphenated. Finally, as it is known like a household word, the phrase becomes one word. Therefore one imagines with the evolution of time: spin trap, spin-trap and finally spintrap! If this is so it seems "spin-trapping" has evolved faster than "spin label" according to the Academic Press Dictionary of Science and Technology."

Edward G. Janzen, Director, National Biomedical Center for Spin Trapping and Free Radicals, Oklahoma Medical Research Foundation, 825 N.E. 13th Street, Oklahoma City, OK 73104 USA

## THE COMPUTER CORNER

*Edited by Philip D. Morse II and Keith P. Madden*

The *Computer Corner* is a new column in the EPR Newsletter which is dedicated to all computer-related aspects of EPR spectroscopy. We are soliciting articles, comments, tips, and so forth for this column. Please send submissions to Reef Morse (E-mail: reef@xenon.che.ilstu.edu) or Keith Madden (E-mail: keith.padden.1@nd.edu). Our full addresses are listed at the end of this column.

Our first article is about the EPR Software meeting at the 1992 EPR Symposium during the Rocky Mountain Conference in Denver, Colorado. It was

written primarily by Richard Cammack with help from Philip "Reef" Morse.

*Meeting on EPR Software.* About 50-60 people attended an informal discussion on Computers in EPR Spectroscopy, at the Rocky Mountain Conference in Denver this August. The unscheduled meeting was convened by Richard Cammack, as an opportunity to sample the opinions of a representative group of researchers. This was taken as guidance for the initial activities of the Computer Software Committee of the Society. Further opinions on these and other topics related to the use of computers in EPR spectroscopy are welcome, and should be directed either to Richard Cammack, Reef Morse, or Keith Madden. Some of the points raised will be the subject of future articles on Computer Topics for the newsletter, for which Reef Morse (Illinois) has agreed to act as first editor. The topics for articles in the EPR Newsletter will be those that members find useful and are willing to write about for one another.

*Software database.* The database of programs for EPR spectroscopy has been revised and updated for 1992, and copies have been circulated to interested spectroscopists. We still hear of other programs, in which case we write to the authors inviting them to participate in the database. The database does not contain the actual program listings at present, only details about what the programs can do, how to obtain them, and any conditions for their use. The database now comprises 143 entries, including commercial programs, and user-written shareware, in a variety of languages and for a variety of computers. Thanks to all programmers who have provided updated information. Thanks particularly to Ruth Williams (King's College London), who has edited the database for the last year. Copies are available for anyone interested, by writing or sending an E-mail message to Ruth (udbro21@hazel.cc.kcl.ac.uk) or to Dick Cammack (udbco33@hazel.cc.kcl.ac.uk).

## BRUKER INSTRUMENTS, PATRON of the International EPR Society

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Telephone: 49 721 5161 141; FAX: 49 721 5161 237.

In USA, contact Dr. Arthur Heiss, 19 Fortune Dr., Manning Park, Billerica, MA 01821. Tel: 508-663-7406; FAX: 508-667-3954.

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A more convenient way of obtaining this information may be directly by electronic mail. Dr. Frank Auteri has installed the database on an anonymous FTP server at the Illinois EPR Research Center, so that it can be downloaded directly. Users should note that it occupies 90 kilobytes of space.

*Here is how to access the database:*

From your Internet or Bitnet site, do the following (don't enter the quotes):

- 1) Type "ftp rlb6000.scs.uiuc.edu" or "ftp 128.173.90.135"
- 2) At the user prompt, enter "anonymous"
- 3) For the password, enter your full E-mail address (for example, auteri@rlb6000.scs.uiuc.edu)
- 4) Now you should be logged in. If this is your first time logging in, you should first download the information file as follows: "get README.EPR" (Do use the capital letters).
- 5) After reading the "README.EPR" file, you can "get eprsftwr.txt."
- 6) "Quit" to end session. If you have trouble, send E-mail to auteri@rlb6000.scs.uiuc.edu or phone Frank Auteri at (217) 333-3776. Send Frank the following if you wish to get onto their E-mail list: Name, full E-Mail address (also TCP/IP address if known), alternate E-Mail address (also TCP/IP address if known), Mailing Address and Phone.

We hope this will continue to be a useful service to users and are conducting a limited survey to follow up our recommended software. We are always interested to hear of new programs or updates. The problem of getting credit analogous to that for regular research papers plagues the writers of computer programs, even though the program may have more influence on the development of science than a regular paper. We ask users of software acquired through the database to acknowledge the original authors when publishing results. It was suggested that programs might be published on a system such as Computer Physics

Communications Library. The programs are described in refereed publications, then made available to subscribers, together with test data. This system has the advantages of standardization of languages and an on-line information service. Some other journals are going in the direction of on-line access. Our present software database is less formal than this; its main value may lie in improved communications between spectroscopists with common problems.

*File transfer formats.*

The BES3T\* (Bruker EPR-Standard for Spectrum Storage and Transfer) file transfer format introduced in 1991 has been modified to incorporate valuable ideas provided by researchers, and was discussed by Francisco Jent. It is to be made available to the EPR community as a standard. A revised version (1.1) of the standard was distributed to attendees. Its use would facilitate the exchange of spectra between instruments. Bruker will be offering developers of software Rfront-endS for converting spectra to BES3T\* format, and will be selling a utility for translations between BES3T\* and other formats. The format is extremely flexible and seems to account for most conceivable methods of acquiring spectral data.

*Database of EPR spectra:* Various possibilities for a database of EPR spectra were discussed. The increasing availability of large-scale storage media such as CD-ROM, and the ability to access them through electronic mail, present new possibilities for a data bank of spectra in which spectroscopists could deposit data. Such a deposition might be done at the time of publication of papers, as occurs with gene sequences. There was some discussion as to whether it should be a database of actual spectra (divided into isotropic radicals, powder spectra, crystals, etc.) in standard format, or of spin hamiltonian parameters, as proposed by Dr. Czeslaw Rudowicz (see Newsletter Volume 3, Number 4). The database of parameters was most favored by the participants at the meeting. It would

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require less storage space but would be difficult for some types of spectra that cannot be simulated unambiguously, as for some biological materials. John Weil volunteered to collect the "inorganic" data. Harvey Buckmaster agreed to assemble data from reprints in the way that he did in his well-known reviews published in *Magnetic Resonance Reviews*. Researchers should send Harvey reprints of data they want to contribute to the data base.

Keith Madden pointed out that Notre Dame has a data center for free radical information which can be accessed by computer. Information about this resource may be obtained from the Radiation Data Center at the Radiation Laboratory, University of Notre Dame, Notre Dame, IN 46556 USA.

*Computer Software Committee:* The initial membership of the Committee will be those who have volunteered to do the work on the initial tasks:

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† Dr. Rudowicz was not present at the meeting but has agreed to serve.

Further volunteers will be solicited to expand the Committee.

## TIPS & TECHNIQUES

### AN ULTRAFAST PULSED EPR SPECTROMETER DERIVED FROM MAGNETO-OPTIC CIRCUITS: A LITERATURE REPORT

*Chris Bender*

*Biotechnology Resource in Pulsed EPR  
Einstein College of Medicine, Bronx, NY 10461 USA*

A pulsed EPR spectrometer that functions on the picosecond time scale has recently been described in the journal *Applied Physics Letters*.<sup>1</sup> This spectrometer is designed primarily for the study of semiconductor materials and, as will be soon apparent from the description, is of limited applicability, however its design features a number of novel ideas that are of interest to instrumentation builders.

The spectrometer is designed around a semiconductor wafer onto which is deposited a pair of parallel transmission lines. The gap between the lines at one end is very narrow, and the two lines are biased by a DC voltage at the other end. An ultrafast pulse is generated by using laser excitation of the semiconductor material in the gap between the two microstrip transmission lines. What one does in such a procedure is photoexcite the electrons in the semiconductor so that carriers are supplied to the region in the gap between the two ends of a transmission line, thus completing the circuit for an extremely short time interval. An ultrashort current pulse, and consequently a magnetic field impulse in the region enclosed by the transmission lines, is thereby generated. In the paper cited above, an ultrashort magnetic field pulse is applied to the sample by using the laser pulse to complete a transmission line loop; the sample is a (very) small YIG film located in the loop, which has a 50  $\mu\text{m}$  perimeter that is delineated by the microstrip lines. The plane of the semiconductor wafer is situated parallel to the DC field, hence the DC and impulse magnetic fields are orthogonal.

The mode of detection that is used in this magnetic resonance spectrometer is also a unique feature. It relies on the so-called 'Faraday Effect,' which is the rotation of plane polarized light by a magnetic field. I found the most detailed textbook treatment of this effect in Max Born's *Optik*,<sup>2</sup> but for the sake of brevity I will simply state that the Faraday Effect establishes a proportionality between the angle of rotation and the magnetic field. The magnetic properties of materials through which the light passes is also manifest in the Faraday Effect; a rather nifty application can be found in some old books on optics and chemical physics that cite measurements of hyperfine couplings by obtaining



the dispersion spectrum (angle of rotation vs. frequency of light).

The spectrometer that is the subject of this review relies on a second probe laser pulse from which the Faraday Effect is measured. In short, this probe pulse succeeds the magnetic field impulse, which has already tipped the spin magnetization away from the axis defined by the DC field, and the probe pulse's polarization allows one to monitor the return of the spin magnetization to equilibrium. With the ultrashort pulses of modern lasers, one can obtain a true FID of electron spins.

The experimental approach that is used in this paper is exciting for two reasons. The first of these is that a magnetic pulse perturbs the sample's magnetization away from the static field. Ordinarily, the perturbation is derived from a pulsed resonant microwave field. One clear advantage of this method is that one obviates the problems of very fast pulsed spectrometers; specifically, those of generating high power microwave pulses of less than 5 ns. Clearly this technique of producing picosecond magnetic field pulses is not simplistic or general enough for routine applications, but it has been well documented in the magneto-optics literature.<sup>3</sup>

The second interesting feature of this spectrometer is the detection scheme, which is likewise divorced from microwave electronics. In short, this novel technique of magnetic resonance is similar to the basic pulsed NMR experiment as it is commonly practiced; a measurement of an FID following a single pulse that alters the magnetization. The novel pulsing and detection scheme of this experiment allows one to perform the same experiment with electron spins. The data presented in this paper include FIDs measured on the 200 GHz timescale for a YIG thin film that has been deposited in the region between the two transmission lines. Finally, I should mention that in an Oxford University Press prospectus of a magnetic resonance book<sup>4</sup> there is listed a chapter by Mehring et al. entitled *Optical Excitation and Detection of Spins*, so the future may hold in store more studies of this kind.

1. Freeman, M.R., Brady, M.J., Smyth, J. *Extremely high frequency pulse magnetic resonance by picosecond magneto-optic sampling*. Appl. Phys. Lett., **60**, 255 (1992).
2. Born, M. *Optik*, Springer-Verlag, Heidelberg 1965.
3. Leonberger, F.J., Lee, C.H., Capasso, F., Morkoc, H. (eds.) *Picosecond Electronics and Optoelectronics II*. Springer-Verlag, Berlin 1987.
4. Bagguley, D.M.S. (ed.) *Pulsed Magnetic Resonance: NMR, ESR, and Optics*. Clarendon Press, Oxford (forthcoming).

## KILLING F.I.D. INTERFERENCE WITH ECHOES

David J. Greenslade

Chemistry Department, University of Essex  
Colchester CO4 3SQ, UK; email: greed@essex.ac.uk

In our work at Essex on coal e.p.r., we have had the problem of some samples having a long free induction decay which interferes with the echo. For two-pulse work we found a significant improvement in technique by the simple field homogeneity spoiling due to a steel bolt placed in the magnet gap. Of course, we do not want to damage the still-pristine pole faces of our old but trusty Varian 9" magnet. We put the one-centimeter bolt inside a piece of rubber tubing before placing it beside the sample cavity. I think that it would not be too expensive to improve this trick by slip-in pole-pieces. It is also worth noting that if one wants a pure echo machine a magnet with high homogeneity is unnecessary. For the three-pulse echo, this method should work, but a more careful approach is needed. A Lorentzian line of width, at half height, 10 gauss with  $g=2$  has an effective  $T_2(T_2^*)$  of about  $1/(\pi \times 30 \times 10^6) = 10$  nanoseconds. Thus the FID has decayed to negligible proportions after a few hundred nanoseconds – the typical value chosen for the separation of the first pulse pair in three-pulse measurements. Clearly a magnetic field gradient of ten gauss across the sample is more than enough to kill F.I.D. interference.

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## NEWS FROM EPR CENTERS

### FROM the NATIONAL BIOMEDICAL CENTER FOR SPIN TRAPPING AND FREE RADICALS:

One of our objectives is to understand the features which influence the EPR intensity of a detected spin adduct obtained from biological spin trapping experiments. We are using the metabolism of  $\text{CCl}_4$  by rat liver to investigate this question. Quantitative EPR experiments are never trivial for solution samples and quantitative spin trapping by EPR is not easy. For those involved in *in-vivo* spin trapping we ask that experiments be repeated a number of times to see whether the EPR spin adduct intensity is consistent. The best we have been able to do with 10 rats treated exactly the same way with PBN and  $\text{CCL}_4$  is  $\pm 40\%$ . Therefore interpretation of small changes in the EPR intensity of spin adducts obtained from biological samples should be approached with caution. Director: Edward G. Janzen, Ph.D. Inquiries should be directed to Audrey Winkles, OMRF, 825 N.E. 13th St., Oklahoma City, OK, 73104, USA; ☎ (405) 271-7570, FAX: (405) 271-3980.

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## *FROM the NATIONAL BIOMEDICAL ESR CENTER in Milwaukee:*

**TRAINING AWARDS** — As described more extensively in a previous issue (EPR Newsletter, v.3#4, Winter, 1991, p. 10), some \$500 awards are available to pre- and post-doctoral young investigators to help expenses for 2-week visits to this Center during 1992. The purposes are to provide training in modern EPR methods and to permit the investigators to use the unique facilities of the Center in their on-going research. The faculty and staff of the Center have expertise in the three main areas of EPR research: free radicals, spin labels and transition metals. To apply, send a letter and one-page research plan; student applications should be accompanied by a letter from the graduate faculty advisor. Address applications to Dr. Ching-San Lai, National Biomedical ESR Center, Medical College of Wisconsin, 8701 Watertown Plank Road, Milwaukee, WI 53226, USA; ☎: 414-266-4051.

## *FROM the ILLINOIS EPR RESEARCH CENTER (IERC) in Urbana:*

**TRAINING AWARDS** — During 1993, we may be able to fund a few awards in a traineeship program similar to that offered by the Milwaukee center (see above). Trainees would take advantage of special facilities or expertise (multifrequency EPR, L- to W-band; S-band pulsed EPR; EPR *in vivo*; EPR imaging; metalloprotein EPR; ENDOR) available at the IERC. Direct inquiries to Becky Gallivan, Univ. of Illinois, 190MSB/MC-714, 506 South Mathews Ave., Urbana, IL 61801; ☎: 217-244-1186; FAX: 217-333-8868.

## *FROM LIVERS (Laboratory for In-Vivo Electron Spin Resonance Spectroscopy) at the Ohio State University, Columbus, Ohio, USA:*

This Laboratory, although not an official NIH ESR Center, is an NIH Research Resource Development, which may eventually attain full-fledged Center (Research Resource) status. Our laboratories are always open to collaborators, especially NIH grantees.

The laboratory currently contains the following equipment: Four ESR instruments: Varian E-4, E-9, E-12 and a V4502 magnet and power supply. Two of the instruments are dedicated L-band facilities for *in-vivo* ESR, while the third instrument may serve as either L- or X-band. The L-band instruments are fitted with a bridged loop-gap resonator or surface coil configuration. The X-band instruments are fitted with TE102 cavities and one Medical Advances X-band loop gap resonator.

The LIVERS principal investigator is Dr. Lawrence J. Berliner. The laboratory's associate director is Dr. Janusz Koscielniak, engineer.

☎ Lab: 614- 292-4178 or 292-9432; ☎ Office: 292-0134 (LJB) or 292-6161 (secretary). FAX: 614 292-1532.

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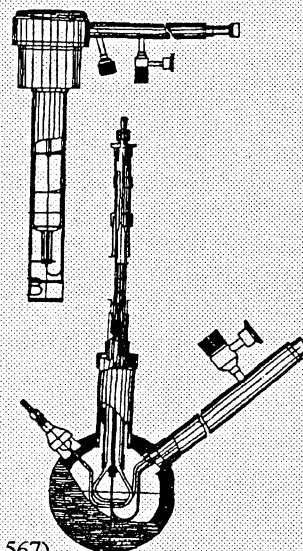
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## BOOKS and PROCEEDINGS

*The Proceedings of the NATIONAL HIGH MAGNETIC FIELD LABORATORY WORKSHOP on NUCLEAR MAGNETIC RESONANCE* (February 1991) includes three chapters on high field EPR. The book is available from Professor Neil Sullivan, Department of Physics, University of Florida, Williamson Hall, Gainesville, FL 32611-2085.

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## NOTICES OF MEETINGS

**FREE RADICALS AND ANTI-ISCHAEMIC AGENTS, December 16-18, 1992, SFRR Europe/Biochemical Society Joint Meeting, London, United Kingdom.** For more information, contact Dr. Rice-Evans, UMDS, Lambeth Palace Road, London SE17EH, United Kingdom. ☎: 071-928-9292.

**INTERNATIONAL CONFERENCE ON CRITICAL ASPECTS OF FREE RADICALS IN CHEMISTRY, BIOCHEMISTRY AND MEDICINE, Vienna, AUSTRIA, February 14-17, 1993.** The organizers are Hans Nohl, president, (Vienna) and Hermann Esterbauer, chairman (Graz).

**Aims of the Conference:** The constantly increasing numbers of reports on free radicals makes it increasingly difficult to evaluate the significance and authenticity of scientific contributions to this field. Controversial findings and interpretations, although stimulating the promotion of scientific knowledge, make it necessary to critically appreciate experimental research conditions, model systems applied, and the biological relevance of results presented. Thus it seems compelling to concern scientists working in the free radical field with critical views of their research work. The aim of the Conference in Vienna is therefore a critical up-to-date survey to elaborate facts and fancies in free radical research.

**Scientific Program:** The scientific program will include the following topics, which are first introduced by the indicated overview speakers, followed by several specific lectures by invited speakers. All details will be announced in the second circular. Posters can be shown throughout the Conference; scheduled Poster Sessions will be held on Sunday, Monday and Tuesday. Opening lecture: Chemistry of free Radicals (R.L. Wilson, UK). Topics include Detection of free radicals in biological systems (E.F. Elstner, Germany), Biological sources of free radicals (B. Halliwell, UK), Consequences of oxidative stress (T.F. Slater, UK),

Facts and fancy of free radicals in the pathogenesis of disease (M.H. Schoenberg, Germany), Role of natural antioxidants in treatment and prevention of disorders induced by oxidative stress (H. Sies, Germany; L. Packer, USA). There will be a workshop on smog (W.A. Pryor, USA).

**Second Circular:** To be mailed in June 1992. It will specify the details of the scientific program and include forms for final registration, information for the preparation of abstracts as well as hotel reservation forms. If interested in the second circular or participating in the Conference, immediately contact: Conference Secretariat and Registration, Vienna Medical Academy of Postgraduate Medical Education and Research, Alser Str. 4, A-1090 Vienna, AUSTRIA ☎: +43(1) 42 13 83-0, 84-0 or 65-0; Fax: +43(1) 42 13 83 23. Contacts for the Scientific Program are: Prof. H. Nohl, Institute of Pharmacology and Toxicology, Veterinary University Vienna, Linke Bahngasse 11, A-1030 Vienna, AUSTRIA ☎: +43 1 711 55-450; Fax: +43 1 713 68 95, or Prof. H. Esterbauer, Institute of Biochemistry, University of Graz, Halbarthgasse 5, A-8010 Graz, AUSTRIA ☎: +43 316 31 330; Fax: +43 (316) 38 40 92

**SILVER JUBILEE MEETING OF THE ELECTRON SPIN RESONANCE GROUP OF THE ROYAL SOCIETY OF CHEMISTRY, March 29-April 2, 1992, University of Sheffield, ENGLAND.** The organizers extend a cordial invitation to all persons interested in ESR spectroscopy in Chemistry, Physics and Biology to attend. Accommodation will be in individual rooms in Tapton Hall of Residence, where the lectures will also take place. **Scientific Programme:** The following have accepted invitations to present plenary lectures: N.M. Atherton, Univ. Sheffield, L.J. Berliner, Ohio State Univ., A.G. Davies, Univ. Coll. London, P.P. Edwards, Univ. Birmingham, B.C. Gilbert, Univ. York, E.G. Janzen, Univ. Guelph, F.E. Mabbs, Univ. Manchester, D. Marsh, Max-Planck Inst., K. Möbius, Freie Univ. Berlin, E. Roduner, Univ. Zürich, and A.J. Thomson, Univ. East Anglia. The following have also accepted invitations to present lectures: S. Colacicchi, Univ. Dell'Aquila, K.P. Dinse, Univ. Darmstadt, G. Gescheidt,

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# EPR NEWSLETTER

Published at the Illinois EPR Research Center (IERC), Urbana, IL 61801, USA

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## **NORELL, Inc.** is a CONTRIBUTOR to The International EPR Society

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Univ. Basel, R.A. Jackson, Univ. Sussex, S.K. Jackson, Univ.  
Wales Coll. Medicine, H. Thomann, Exxon Research, and L.J.  
Yellowlees, Univ. Edinburgh.

Registration forms will be sent out in November to all who  
have indicated an interest in the Conference. For further  
details and registration forms, contact,

Mrs. J. Taylor, School of Chemistry,  
Univ. of Birmingham

Edgbaston, Birmingham B15 2TT U.K.

**1st INTERNATIONAL CONFERENCE OF THE  
POLISHESR GROUP, ELECTRON SPIN RESONANCE  
OF RADICAL AND METAL COMPLEXES, May 31-  
June 4, 1993, Zakopane, POLAND.** Scope and Topics of  
the Conference: A broad range of problems which can be  
solved by use of ESR spectroscopy. Its application in such  
fields as chemistry, bio-chemistry, physics and bio-physics.  
Studies on paramagnetic intermediates generated by radiolysis  
and photolysis. Technical aspects and modern trends in ESR  
spectroscopy and related techniques.

The program will include plenary lectures as well as oral and  
poster presentations. A short organizing meeting of the Polish  
ESR Group will be held during the Conference.

Organizing Committee: Professor Andrzej Chmielewski,  
Assoc. Professor Hanna B. Ambroz, Dr. Zbigniew Zimek. For  
information, contact Hanna Ambroz, The Polish ESR Group  
(in organization), Institute of Nuclear Chemistry and  
Technology, ul. Dorodna 16, 03-195, Warszawa, POLAND.

**INTERNATIONAL SCHOOL ON ESR DOSIMETRY,  
June 2-11, 1993, Elba International Physics Center  
(EPIC), Manciana Marina (Elba Island), ITALY.** Topics:  
Radiation Physics & Chemistry, Materials & Radiation Effects,  
Radiation Measurements, ESR Theory & Instrumentation,  
Instrumental Advances, Dosimetry for Radiation Processing,  
Dosimetry for Therapy, Alanine Dosimetry, Radiation  
Accident Dosimetry, Identification of Irradiated Food, Dating,  
Imaging. The school will be held in English. The final  
program, travel/accommodations information, and instructions  
on paying participants' fees will appear in the second  
announcement. For information, contact the school secretary,  
Paola Di Ciaccio, Physics Laboratory, Istituto Superiore di

Sanita, Viale Regina Elena, 299, 00161 Roma, ITALY; ☎ 39-  
6-4990 (ext. 889); FAX: 39-6-4462872; E-mail:  
paolad@sanita.infn.it / paolad@ismis. In the US, contact  
Marc F. Desrosiers, Bldg. 245, Rm. C229, Ionizing Radiation  
Division, NIST, Gaithersburg, MD 20899, USA; ☎ 301-975-  
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**EMARDIS-93 (THIRD INTERNATIONAL WORK-  
SHOP ON ELECTRON MAGNETIC RESONANCE OF  
DISORDERED SYSTEMS), June 7-14, 1993, Sofia,  
BULGARIA.** The aim is to cover all aspects of recent  
development in the theory, methodology, instrumentation, and  
experiments of electron magnetic resonance (EPR, ENDOR,  
ESE) spectroscopy of disordered systems in lectures, posters,  
and round-table discussions. Official language: English.  
Current plans are to start late on a Monday and finish early on  
the Friday. Later that day the Q-EPR Expert Meeting (see next  
announcement) will commence, and it will close on Monday  
after breakfast.

Short abstracts of the EMARDIS-93 papers will be  
available at the meeting; full papers based on the invited  
lectures will appear in a Proceedings.

Contact one of the following:

(a) N. D. Yordanov (Convener) or M. Ivanova (Sci. Sec'y,  
Q-EPR), Institute of Kinetics and Catalysis, Bulgarian  
Academy of Sciences, 1113 Sofia, BULGARIA. Telex: 22729  
echban. FAX: (+3592) 756-116 or 720-038; ☎: 713-2546 or  
713-3917. or (b) G. Gochev (Sci. Sec'y, EMARDIS),  
Department of Chemistry, Sofia University, 1 James Bourchier  
ave., 1126 Sofia, BULGARIA. ☎: (+3592) 62-561 ext. 223.

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**FIRST INTERNATIONAL EXPERT MEETING ON QUANTITATIVE EPR (Q-EPR), to be held near Sofia, Bulgaria in June, 1993** immediately following the EMARDIS-93 workshop; see the announcement immediately above.

**SIXTEENTH INTERNATIONAL EPR SYMPOSIUM at the 35th Annual Rocky Mountain Conference, Denver, CO, USA, July 25-29, 1993.** To be held at the Hyatt Hotel in Denver. For further information, contact Profs. Gareth R. Eaton or Sandra S. Eaton, Dept. of Chemistry, University of Denver, Denver, CO, 80208, USA; E-mail: seaton@ducair.bitnet.

**2nd FAR EASTERN CONFERENCE ON MEDICAL AND BIOLOGICAL ENGINEERING 1993, Beijing, CHINA, August 15-17, 1993.** The purpose of this meeting is to exchange information and encourage cooperative development of medical and biological engineering in the Far East and the other parts of the world. The theme of this conference is to look at high level science and technology, especially to accelerate the progress of medical and biological engineering and to promote medical care. Deadline for submission of abstracts is November 30, 1992. For more information, contact Secretariat of 2nd FECMBE, c/o Chinese Society for Biomedical Engineering, 5 Dong Dan San Tiao, Beijing 100005, China.

**WORKSHOP ON *IN VIVO* EPR AND EPR STUDIES OF VIABLE BIOLOGICAL SYSTEMS, October 18-21, 1993** at the Dartmouth Medical School, Hanover, New Hampshire, USA. Sponsored by the Illinois EPR Research Center (IERC) and held at the IERC Dartmouth site. The dates are set to coordinate with the 4th International Symposium on Spin Trapping. This meeting aims at bringing together members of all of the laboratories that are directly and indirectly applying EPR to viable biological systems, with a special emphasis on *In Vivo* EPR. The format will stress discussion and sharing of information, in order to facilitate progress in this field. Attendance will be limited in order to achieve the goals of the workshop. For those planning to attend: please notify the organizing committee of your intentions to attend and tentative title(s) of your presentation(s). The organizers also welcome suggestions on possible participants who should be invited to attend. Please address correspondence on the meeting to: Harold M. Swartz, M.D., Ph.D., Dartmouth Medical School, 7250 Strassenburgh 308, Hanover, NH 03755-3863, USA. Fax: 603-650-1225. E-Mail: Harold.Swartz@Dartmouth.edu.

**4TH INTERNATIONAL SYMPOSIUM ON SPIN TRAPPING AND ORGANIC EPR SPECTROSCOPY WITH APPLICATIONS IN CHEMISTRY, BIOLOGY AND MEDICINE, Oklahoma Medical Research Foundation, Oklahoma City, Oklahoma, USA, October 25-28, 1993 (Monday to Thursday).** Note that the name and dates of this symposium have been changed since the announcement in the previous issue of the EPR Newsletter. For this meeting,

spin trapping is defined as any radical addition reaction (trapping) which produces an addition product (adduct) with the radical group attached. The structure of the adduct can be determined by any means, e.g. EPR, MS, NMR, etc. Hydrogen atom abstraction reactions are not considered spin trapping. Further details will appear in the next issue (Vol 4, #4) of the EPR Newsletter. The local organizing committee is as follows: Edward G. Janzen (host); Coit M. DuBose, Robert A. Floyd, Yashige Kotake, Paul B. McCay, J. Lee Poyer, Lester A. Reinke. Secretary, Mrs. Audrey Winkles. Please address inquiries and requests for the First Announcement to: Free Radical Biology and Aging Research Program, Oklahoma Medical Research Foundation, 825 N.E. 13th St., Oklahoma City, OK 73104 USA. ☎: 405-271-7570; FAX: 405-271-3980.

## POSITIONS OPEN

**POSTDOCTORAL POSITIONS AT THE UNIVERSITY OF DENVER, Fall/Winter 1992.** Two postdoctoral openings are available immediately in our laboratory:

Position 1: The Postdoctoral Research Associate will design, perform, and interpret experiments involving electron spin-spin interaction in metallobiochemistry. A Ph.D., experience in handling metalloproteins, including purification and characterization, and sufficient background with spectroscopy to learn continuous wave EPR is required. Time-domain experiments will be performed in cooperation with other members of the research group. Experience with spin-labeling and hemoglobin is desired.

Position 2: The Postdoctoral Research Associate will design, perform and interpret EPR imaging experiments on conducting polymers and irradiated materials. A Ph.D. and knowledge of continuous wave EPR is required. Contact:

Gareth or Sandra Eaton, Department of Chemistry  
University of Denver, Denver, CO 80208 USA  
☎: 303-871-2980 (GRE); ☎: 303-871-3102 (SSE)  
FAX: 303-871-2254.

Bitnet: geaton@ducair; seaton@ducair

**POSTDOCTORAL/RESEARCH ASSOCIATE.** One or two positions available in projects using epr spectroscopy in viable biological systems *in vitro* and *in vivo*. Required: background in EPR spectroscopy and/or working with viable cells and animals. Send C.V. and three letters of reference to:

Dr. Harold Swartz, Dartmouth Medical School  
308 Strassenburgh Hall, HB 7250  
Hanover, NH 03755-3863, USA  
☎: 603-650-1955; FAX: 603-650-1225  
E-Mail: Harold.Swartz@Dartmouth.edu

# EPR NEWSLETTER

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**GRADUATE RESEARCH ASSISTANTSHIP (OR POSSIBLY POSTDOCTORAL FELLOWSHIP)** soon will be available to study mechanisms of NMR relaxation enhancement by paramagnetic MRI contrast agents. The studies involve chemistry, theory, multifrequency EPR (including ENDOR and pulsed EPR), and NMR (including relaxometry and MRI). Equal opportunity employer; minority applications are encouraged. Send transcript and two recommendation letters to:

Prof. R. B. Clarkson, Univ. of Illinois  
257 LAC  
1008 W. Hazelwood Drive  
Urbana, IL 61801, USA  
☎: 217-244-1375; E-mail: r-clarkson@uiuc.edu

## POSTDOCTORAL OR SABBATICAL FACULTY.

I have been offered substantial funding for pulsed EPR studies on coal, to extend the work we have already performed using our coherent magnetron-based X-band instrument. Faculty seeking a sabbatical post or post-doctoral workers seeking an appointment are invited to contact me to discuss it:

David J. Greenslade  
Department of Chemistry & Biological Chemistry  
University of Essex  
Colchester, CO4 3SQ UK  
☎ 206-872242; FAX: -873598  
E-mail: greed@sx.ac.uk

## SITUATION WANTED

Ph.D. student finishing his thesis in September 1993 on the EPR study of intermediates in electrochemical reactions seeks a postdoctoral position in an EPR laboratory.

Peter Rapta  
Dept. of Physical Chemistry  
Slovak Technical University  
CS-812 37 Bratislava  
CZECHOSLOVAKIA

## NOTICES

### POSSIBLE SUPPORT

The National Research Council (NRC) invites applications from American scientists and engineers who wish to host colleagues from the Newly Independent States (NIS) for one academic year (up to nine months) to carry out joint research in U.S. universities and private research institutions. Proposals are invited in the following fields: applied mathematics/statistics, control theory, computer science, aeronautics, applied physics,

materials science, nuclear science, electronics, chemistry, microbiology, virology, and all branches of engineering. Deadlines for the first two grant cycles have already passed, but application may still be made by March 1, 1993 for the third grant cycle. For applications, write to:

National Research Council, OCEE/OIA (F02014)  
2101 Constitution Ave., NW,  
Washington, DC 20418 USA

### BAD ADDRESSES (Returned Mail; Lost Members)

**Help, please!** Mail sent to the following society members has been returned. Please contact the editorial office (see page 1) if you have a current address for any of these members:

Bakker, Martin	Argonne, IL USA
Bartl, Anton	Dresden, GERMANY
Baumgarten, Martin	Princeton, NJ USA
Ebert, B.	Berlin, GERMANY
Garrett, R.W.	Menai, AUSTRALIA
Gorbatenkova, E.A.	Moscow, USSR
Hanna, Phillip	Research Triangle Park, NC, USA
Herrling, Thomas	Berlin, GERMANY
Imanova, M. A.	Moscow, USSR
Linhares, Marilia P.	Rio de Janeiro, BRAZIL
Pavlova, Valentina	Moscow, USSR
Pelekh, Alexey E.	Moscow Region, USSR
Sergeev, A.	Moscow Region, USSR
Slane, Jean M.K.	Milwaukee, WI USA
Snyder, Seth W.	Argonne, IL USA
Swauger, James	Baltimore, MD USA
Tse, Susanna Y.	Washington, DC USA
Uricze, Jacobien	Leiden, NETHERLANDS
Vesnina, Y. I.	Moscow V-71, USSR

## EQUIPMENT & SUPPLIES EXCHANGE

### WANTED: VARIAN EPR UNIT.

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California State University  
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San Bernardino, CA 92407-2397  
☎: 714-880-5410; Fax: 714-880-7005  
Email: tusher@wiley.csusb.edu

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## AVAILABLE: VARIAN V 4500 MODULES.

Modules for the Varian V4502 EPR spectrometer are available from G. R. or S. S. Eaton at the University of Denver. E-Mail: GEATON@DUCAIR.BITNET.

## AVAILABLE: BOXCAR AVERAGER

An inexpensive boxcar averager designed for use in electron spin echo (ESE) spectrometers is available from the University of Denver. At slow repetition rates it gives about two orders of magnitude better S/N than the well-known PAR 162/164 boxcar. Contact Richard Quine at the University of Denver, Denver, CO 80208 USA (☎: 303-871-2419).

## AVAILABLE: VARIAN 620L BOARDS.

A full set of boards for the Varian 620L computer is available from Sandra or Gareth Eaton at the University of Denver (BITNET SEATON@DUCAIR).

## WANTED TO BUY: USED EPR SPECTROMETER.

A unit such as a Varian E-4 or E-9 would be ok. Electromagnet (or cavity) not necessary.

Contact Mark Rubinstein at the Naval Research Laboratory, Washington, DC 20375, USA (☎: 202-747-4207).

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Anatol E. Myshkin,  
N.N. Semenov Institute of Chemical Physics  
of the Russian Academy of Sciences,  
Kosygin str., 4, 117977  
Moscow V-334, RUSSIA

## OFFERED: VARIAN FIELD SCAN CONTROLLER CARDS

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Contact:  
Richard Quine (☎: 303-871-2419).

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The technical contact is:

Dr. F.G. Chercasov, Kazan, Phys-Techn. Institut  
420029 Kazan Sibirsky tract, 10/7  
Tatarstan (Russian Federation) ☎: (8432) 39-30-87.

The administrative contacts are:

In Moscow: Dr. G.A. Denisenko, Institute of Crystallography, Leninsky pr., 59 Moscow 117333 RU; ☎: 7-095-135 6420; FAX: 7-095-135 1011. In Kazan: Dr. F. Gubin, 420020 Kazan Volodarskogo, 1-60, Tatarstan (Russian Federation). ☎: (8432) 39-30;87, telex: 224864 ptb su

## CORRECTIONS & ADDITIONS

**Help, please!** At the EPR Symposium in Denver in August, we set out in the poster area a Newsletter mailing list so that attendees could make corrections or additions. After several conferees had made their corrections, the list disappeared. We would appreciate its return. If you made corrections or additions, we apologize for the inconvenience and ask you to drop a note with the correct information (name, address, telephone, fax, E-mail address) to Becky Gallivan in the editorial office in Urbana (see front page).

**Correction:** Both date and title of the 4th Spin Trapping symposium (October, 1993) have been changed. This issue contains the correct information.

## ☺ ON THE LIGHTER SIDE...

This item was sent in by Reef Morse:

Actual message in fortune cookie served at the banquet at the recent Denver EPR Symposium: "You have an unusually magnetic personality."





# EPR NEWSLETTER

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Page 1

Winter, 1992-3

This publication is the official newsletter of the INTERNATIONAL EPR(ESR) SOCIETY. It is supported by the Society, by corporate and other donors, and by three national Centers for EPR/ESR spectroscopy in the USA. These Centers are sponsored by the Division of Research Resources, U.S. National Institutes of Health:

**National Biomedical ESR Center**, Prof. James S. Hyde, Director. Medical College of Wisconsin, MACC Fund Research Center Building, 8701 Watertown Plank Road, Milwaukee, Wisconsin 53226, USA. ☎: 414-266-4000. FAX: 414-266-4007. E-Mail: felixc@uvax01.biostat.mcw.edu

**Biotechnology Resource in Pulsed EPR Spectroscopy**, Prof. Jack Peisach, Director. Albert Einstein College of Medicine, Department of Molecular Pharmacology, 1300 Morris Park Avenue, Bronx, New York 10461, USA. ☎: 212-430-2175. FAX: 212-829-8705. E-mail: peisach@aecom.yu.edu

**Illinois EPR Research Center (IERC)**, Prof. R. Linn Belford, Director; Prof. Harold M. Swartz, Co-Director; Prof. Robert B. Clarkson, Associate Director; Prof. Peter G. Debrunner, Co-Principal Investigator; other senior staff: Prof. Mark J. Nilges, Dr. Alex Smimov, Laboratory Manager, and Dr. Tadeusz Walczak. University of Illinois at Urbana, 190 MSB, 506 South Mathews, Urbana, IL, 61801, USA. ☎: 217-244-1186. FAX: 217-333-8868. E-mail: ierc@uiucvmd.bitnet; r-belford@uiuc.edu; or belford@rlb6000.scs.uiuc.edu. (IERC also operates a satellite site for EPR *in vivo* at Dartmouth University in Hanover, New Hampshire; ☎: 603-650-1955; FAX: 1935. E-mail: harold.swartz@dartmouth.edu)

*These Centers, which were described in our first issue (Volume 1, #1), cooperate to facilitate research requiring EPR-related techniques. Prospective collaborative or service users may contact the staff at any of the Centers.*

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**HOW TO REACH US** — To communicate about the EPR Newsletter or submit material, contact R. Linn Belford, Editor or Becky Gallivan, Editorial Assistant, at IERC (address above).

## BLEANEY HONORED AT CELEBRATION OF THE ZAVOISKY AWARD—

The Second Annual Zavoisky Award in Electron Paramagnetic Resonance Spectroscopy was awarded to Oxford University's Prof. Brebis Bleaney in a ceremony marking his outstanding contributions to the theory and practice of electron paramagnetic resonance of transition metal ions in crystals.

The Award was presented September 28, 1992 in the capital city of the Tatarstan Republic Kazan, the Motherland of Magnetic Resonance. It was there that Academician E.K. Zavoisky first demonstrated EPR in 1944. The Zavoisky Award consists of a Diploma, a Medal and one thousand dollars.

The Zavoisky Award was established by the Zavoisky Physical-Technical Institute of the Russian Academy of Sciences with support from the Kazan State University, the Springer-Verlag Publishing House, the Tatarstan Republic, the Tatarstan Academy of Sciences, the Ampère Society and the International EPR Society. The Award Selection Committee consisted of well-known experts in EPR: Professors K. Hausser (Heidelberg), C.A. Hutchison Jr. (Chicago), Yu.N. Molin (Novosibirsk) and the Chairman K.M. Salikhov (Kazan). The selection of Prof. Bleaney was made from many nominations solicited from international experts in EPR.

The Award Ceremony, attended by over 300 people, including scientists from different countries, was chaired by the Vice-President of the Tatarstan Republic. A choral concert followed to mark the event which concluded with a Banquet to honor Prof. Bleaney and his outstanding contributions to EPR. After a stay in Kazan the laureate and his wife visited Moscow and St. Petersburg.

# EPR NEWSLETTER

Published at the Illinois EPR Research Center (IERC), Urbana, IL 61801, USA

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Winter, 1992-3

## From the Editor

This is the annual public issue of the EPR Newsletter, which circulates to about 3000 scientists worldwide. Four issues a year are published for the members (ca. 1000) of the International EPR(ESR) Society. To our nonmember friends: If you enjoy the EPR Newsletter and/or would like to have a say in what appears in it, I invite you to join us in the Society. The dues are modest; you will find a registration form at the end of this issue. Companies are also welcome to join the current eleven corporate members. All get display boxes in each EPR Newsletter issue. If you know of companies that should be members, please tell them or tell us.

To keep costs down, much of the publication and distribution is by volunteer effort. JEOL kindly takes care of some of the mailings. A great deal of the mailing and distribution is handled by Bruker (USA branch) as part of its support for the Society. Some distribution must be by bulk mail, which is cost-effective but rather slow. Dated material such as meeting notices must be sent in as early as possible to insure that it reaches the readers well before the critical dates. The publication header indicates the season in which an issue goes to press.

What would you like to see in the EPR Newsletter? What are your reactions? Let us know, please! Dr. Peter Gast (Physics, University of Leiden, Netherlands) recently wrote us to suggest that we occasionally publish, in either a members' issue or a supplement, the full directory of members with affiliations, addresses, phone and FAX numbers, E-mail addresses, and scientific interests. I think that's a good idea. We are always happy to have good items for the "Tips and Techniques" section - the kind of thing that would be interesting and useful to colleagues, but which would not be appropriate as a regular journal article. Starting with the last issue, we started a regular column called The Computer Corner. Are there other topics that you think merit a regular column? (If you propose a new column, suggest a good editor for it.) We want to keep readers informed of pertinent new books and conference proceedings, but some appropriate items do not come to our attention. Who will volunteer to be a self-appointed spotter to let me know of such items?

The next issue (Spring, 1993) will include an extensive report on the Second Workshop on the Future of EPR, which was held in Denver last August.

R. Linn Belford

# JEOL

EPR

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## Nominations Open for Third Zavoisky Award

The 3rd Zavoisky Award will be presented at the annual Workshop "Modern Development of Electron Paramagnetic Resonance: Multifrequency EPR" in September 1993 in Kazan, where E.K. Zavoisky first demonstrated EPR in 1944. This prestigious award recognizes outstanding contributions to the development of electron paramagnetic resonance. It is presented by the Kazan Zavoisky Physical-Technical Institute of the Russian Academy of Sciences, Kazan State University, the Tatarstan Academy of Sciences, and Springer-Verlag Wien New York. The award-winner's lecture will be published in the journal "Applied Magnetic Resonance."

Nominations are sought from the EPR community worldwide. A brief 1-2 page presentation of the applicant is expected. The final decision is made by the Award Selection Committee, which comprises well-known experts in EPR: H.K. Hausser (Heidelberg), C.A. Hutchison Jr. (Chicago), Yu.N. Molin (Novosibirsk) and the Chairman K.M. Salikhov (Kazan). Nominations should be submitted to:

Dr. Laila V. Mosina, Executive Secretary, Zavoisky Award Committee, Kazan Zavoisky Physical-technical Institute of the Russian Academy of Sciences  
Sibirsky trakt, 10/7,  
Kazan, 420029, Russian Federation  
(Nominations are requested by April, 1993.)

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## ◆ IES AFFAIRS ◆ ANNOUNCEMENTS AND REPORTS FROM THE INTERNATIONAL EPR SOCIETY

### PRESIDENT'S REPORT

Hopefully this will be my last (or next to last) report as your President, as we are getting ready to have nominations and the election of officers for the next three (3) year term. In order to proceed with the transition in an effective and informed manner, the Council of the Society has been polled for their input on a number of subjects. The following summary is aimed both at informing you and, especially, TO SOLICIT YOUR INPUT ON THESE ISSUES.

Please communicate your comments and suggestions directly to me and I will pass them on to the appropriate committees, etc. The questions posed to the Council members are indicated below within quotation marks and then a summary of their responses is provided.

1. Selection of officers: "We need to hold an election within the first few months of 1993 for the officers who will serve for the next three years. In order to do this effectively, we need to receive your input as to both the individuals to be nominated and whether we should nominate more than one person for any of the offices. Your input will be provided to the nominating committee who will prepare the slate of officers to be voted on by the membership. The members also will be solicited for input. It is strongly recommended that most or all of the new officers be located in Europe and/or Asia so as to confirm the international nature of

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the Society. (The constitution calls for the outgoing president to continue for an additional three years as an officer with the title Past President; therefore, the North American component of the Society will continue to be represented in the officers of the Society, as well as having extensive representation on the Council.) In making recommendations for the various offices of the Society, please keep in mind the need to select individuals who will be willing and able to carry out the tasks involved in the management of a young and growing society and, also, who have well-established scientific reputations. (The current Vice President, Karl Hausser, has served only part of a term because the original nominee was unable to serve; he has agreed to serve a full term (93-96) if nominated and elected.)" The consensus was that it would be very desirable to have some of the next group of officers, especially the president, come from Europe. There were several suggestions that it would be desirable to rotate the presidency among the Americas, Europe, and Asia-Australia. Specific nominations for the officers have been passed on to the nominations committee. The Council was evenly divided as to whether more than one person should be nominated for an office.

2. Nominations for the silver and bronze medals: "One of the important functions of the Society is to provide recognition and encouragement for the large and diverse membership of the Society which extends across three broad disciplines: physics, chemistry, and biology. In order to do this, we have established a set of silver medals to be awarded to up to three senior individuals per year in each of the three disciplines, and a set of bronze medals for junior scientists. The awarding of medals in separate categories was established because of the diverse nature of the Society and the large number of outstanding individuals using EPR. In order for this selection to be as rigorous as possible, we need to have the thoughtful input of the most senior members of the Society: the Council. Your advice will be forwarded to three separate committees who will deal with each of the three subject areas; they will make their nominations on an annual basis. Please indicate your suggestions for persons to be considered in at least one and, preferably, all three disciplines. We also solicit your input for next year's gold medalist."

Several nominations were made in each category BUT THE COMMITTEE WOULD BENEFIT GREATLY FROM ADDITIONAL NOMINATIONS IN ALL THREE FIELDS AND BY VOLUNTEERS TO SERVE ON THE COMMITTEES.

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3. Organization and sponsorship of meetings by the International Society: "Although it was one of the founding precepts of the Society that we would not displace any of the existing meetings, there have been many suggestions from members who indicated that they felt it would be possible and desirable for the International Society to organize a comprehensive meeting on EPR that was truly international and multidisciplinary, without disrupting existing meetings. Some of the suggestions have been to do this on a one-time basis in honor of the upcoming 50th anniversary of the discovery of EPR, but others have indicated that it would be desirable to have such meetings on a more regular basis, every one, two, or three years. It also has been suggested that this function might be carried out in collaboration with the existing organization of ISMAR, if the International EPR Society is authorized and willing to take on the major organizing responsibility for the EPR section of ISMAR. These are complex and potentially controversial issues for which we need the advice and counsel of the members of the Society; hence the request for your input."

The responses were: 1) A consensus that it would be desirable to have a special meeting or meetings in honor of the 50th anniversary of the discovery of EPR (ESR); 2) There was a majority, but by no means unanimous, view that the Society should periodically

organize an international meeting, about every three years; 3) Most, but not all, of the members of the Council felt that it was desirable to have the Society organize the EPR section of ISMAR, if ISMAR agreed readily to this.

4. Membership in the International EPR Society and Participation by Other EPR Societies: "The International Society takes pride and strength from the involvement of scientists from a wide range of disciplines and a wide range of countries. In some countries and regions, however, participation in the International Society has been retarded or confused by questions as to how scientists who already are members of national or regional EPR Societies should relate to the International Society. So far our general approach has been to encourage all eligible individuals to join the International Society directly but also to indicate a willingness to establish relationships with existing national or regional societies whereby membership in their society would also lead to membership in the International EPR Society. We seek your input on the general approach and on any specific suggestions you might have in this regard." The consensus was to continue this policy.

5. Membership Dues for the International EPR Society: "Our current policy has been keep the dues very low and to be very liberal in regard to forgiveness of dues for members living in countries where financial instability and/or the nonconvertability of their currency make payment of dues in hard currency difficult or impossible. The liberalness of our policy has extended even to members who have ready access to hard currency, going so far as retaining as members individuals who have joined the Society but not regularly paid their membership dues. There are even some members of the Society, including members of the Council, who have never paid dues. We thus have been faced with a potential conflict between establishing a large and broadly based Society, fairness, and financial

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responsibility. So far the last has not been a significantly limiting factor due in part to the willingness of some members of the Society to take on responsibilities and even cover some of the costs of the Society from their institutions and to the continuing and growing support of the Society by corporate members. We seek the advice of the Council on both general and specific policies in regard to dues."

The consensus was that these general policies should be continued. Members who fail to pay dues (or to make other arrangements) should be given ample warning, but eventually (after 1-2 years), should be dropped.

6. Newsletter: "The Newsletter of the Society is the most visible manifestation of the existence and activity of the Society. The current policy is to put it out four times per year. While the Newsletter clearly has been successful and plays a key role in the development of the Society, we continue to seek ways to make it even better." The consensus was that the Newsletter is very valuable and about the right size and frequency. Some concerns were expressed about the timeliness of publication and/or receipt. There was general satisfaction with the editorship.

7. Fellows of the Society: "Several members have suggested a special category of membership of the Society to indicate those EPR scientists who have made particularly outstanding contributions. This could be done through the mechanism of the category of "Fellows" of the Society. What do you think of this idea? Strong arguments have been made in favor of it because of the excellence of many of the members of the Society but others have argued strongly against it, indicating that such a process is potentially unfair and/or elitist." Several members thought that this was a very good idea while the majority did not favor this, at this time. There was considerable sentiment to reconsider this issue in a few years.

8. Composition of the Council: Members of the Council were asked to review the composition with regard to representation of geographic areas and disciplines. There was a consensus that we should seek more members from Asia, Australia, Africa, and eastern Europe. YOUR INPUT IS SOLICITED - soon we will begin to rotate up to 1/3 of the members each year and also can add up to eight additional members.

9. The Future: "What should be our priorities for the next three years?" WE REQUEST YOUR INPUT, which will be passed on to the new officers.

Harold (Hal) Swartz  
President, International EPR (ESR) Society

## EPR CONFERENCE TRAVEL GRANTS FOR STUDENTS - CALL FOR APPLICATIONS:

The International EPR Society provides travel grants to students (including postdoctoral student members of the Society) to help defray their expenses in traveling a long distance to present EPR-related work at an appropriate conference (see "Notices of Meetings" in each Newsletter). A student may apply for an award of up to \$250(US) in a brief (1-2 page) letter with (1) some information about him/herself, (2) reasons for wishing to attend and present work at the particular meeting specified, and (3) the endorsement of the student's research advisor. The Awards Committee makes all decisions and announces results to all applicants. Send applications to Prof. L. J. Berliner, co-Chair, IES Awards Committee, Dept. of Chemistry, The Ohio State University, 120 West 18th Ave., Columbus, OH 43210-1173, USA. ☎: 614-292-0134; E-Mail: [berliner@livers.mps.ohio-state.edu](mailto:berliner@livers.mps.ohio-state.edu)

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Published at the Illinois EPR Research Center (IERC), Urbana, IL 61801, USA

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**"APPLIED MAGNETIC RESONANCE" – SPECIAL OFFER FOR IES MEMBERS:** By arrangement with the publisher, members of the International EPR(ESR) Society may subscribe to the journal "APPLIED MAGNETIC RESONANCE" (K.M. Salikhov, Ed.) for a very small fraction of the public subscription cost. For example, in the USA the IES rate will be \$92 (plus postage). Orders and inquiries must go directly to Springer-Verlag Wien, Sachsenplatz 4-6, A-1200 Wien, AUSTRIA. FAX: 43-222-330-24-26. Payment may be made by check or standard credit card.

## NOMINATIONS FOR IES AWARDS INVITED

The IES invites nominations for the following awards. Disciplinary Awards subcommittees have been named. Please send them your suggestions: (For Physics and Instrumentation - Jim Hyde, Chair; John Pilbrow; George Feher; & Jan Stankowski. For Chemistry - Bruce Gilbert, Chair; J. Sohma; Jim Bolton; & Kev Salikhov. For Biology/Medicine - Larry Berliner, Chair; Marjeta Sentjurc; Hideo Utsumi; & Tadeusz Sarna).

**Gold Medal:** The Gold Medal, recognizing benchmark contributions to EPR spectroscopy as a whole; one award per year (first 2 winners: George Feher and Jim Hyde);

**Silver Medals:** Three Silver Medals each year, one each in the general areas of Chemistry, Physics, and Biology/Medicine;

**Young Investigator Awards:** Three Young Investigator awards each year, in the same fields as the Silver Medals; "young" is defined as less than 7 years since the Ph.D. degree.

## Student Travel Awards:

Applications for student travel awards are acted on by the Awards Committee as described in most issues of the EPR Newsletter (this issue, p. 5).

**TRAVEL SUPPORT TO MEETINGS IN EASTERN EUROPEAN COUNTRIES:** As previously announced, the Society has established a temporary system of small grants to facilitate travel to EPR related meetings within those Eastern European countries which recently have suffered a calamitous decline in research support. The normal policy of the Society is to provide travel stipends only to students and very junior

scientists. But during this emergency period, these grants are available to all scientists, junior and senior, in Eastern Europe. Hard currency grants of \$10 to \$25 each should enable travel to meetings in these countries. IES funds for this are administered by a committee chaired by Yakov Lebedev (Institute of Chemical Physics, Russian Academy of Sciences, Kosygin Str.4, 117977 Moscow V-334, Russia). To apply, write directly to him providing details on the meeting to be attended and the amount of hard currency required for the travel expenses. The program will be reviewed soon to determine whether it should be extended.

## LETTER TO THE EDITOR

Sir:

At the present time, specialists are increasingly attracted to advanced EPR spectroscopies. Nevertheless in this letter we would like to point out some new possibilities in Spin Labelling and Spin Trapping, which allows one to obtain the additional information using routine cw EPR. The features and advantages demonstrated by 3- imidazoline (imidazolidine) nitroxyl labels (Imidazoline Nitroxides, ed. Volodarsky, L.B., V.1-2, CRC Press, Boca Raton, 1988) allows one to determine extra parameters of the systems studied.

### Spin pH-probes and Labels

Due to the ability of protonation of nitrogen atom N3 in radical heterocycle, the imidazoline radicals are the most effective spin pH- probes. These spin pH-probes are useful for measurement of local pH-values within the range of pH from 0 to 14, the accuracy of determination is 0.05 pH units (Khramtsov and Weiner 1988, in Imidazoline Nitroxides (ed. Volodarsky, L.B.) V.2, pp.37-80, CRC Press, Boca Raton). The application of these radicals provides quantitative information about thermodynamic and kinetic characteristics of the proton exchange reactions, isotopic effect studies included.

The use of spin pH-probes in biological systems seems extremely promising. The measurement of intraliposomal pH gives the new EPR approach for kinetic investigation of proton transport across phospholipid membranes (Khramtsov et al. 1989, J.Bioch.Bioph.Meth., 18, 237; 1992, in Abstr. 14th ICMRBS, P245, p.124, Jerusalem). pH-Titration of the radicals located at the surface allows one to estimate the surface polarity and the electrostatic surface potential of biological membranes and proteins (Khramtsov et al. 1992, Bioch.Bioph.Acta, 1104, 317). The recent success

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in the synthesis of spin pH-labels for physiological pH region (Balakirev et al. 1992, Synthesis, planned for No.12) allows one to apply these labels for pH measurement inside various cells and cellular organelles.

## *Paramagnetic reagents for SH-group titration and their modification.*

The disulfide biradical RS-SR with imidazoline radical fragment is the ideal label for SH-group titration both in high- and low-molecular-weight compounds. The biradical is shown to participate in a thiol-disulfide exchange reaction with dramatic changes in EPR spectra. The method proposed allows determination of 0.1 - 1  $\mu$ M thiols and their reactivity even in colored and highly absorbing samples. The method proved highly sensitive and reproducible for intracellular glutathione measurement (Khrantsov et al. 1989, Analytical Biochemistry, 182, 58; Weiner et al. 1991, FEBS Lett., 290, 243; Zimmer et al. 1992, Arzneimittel-Forschung/Drug Research 42(1), 6, 829 and Strahlentherap. Onkologie 168, 419). The method is useful to measure the rate of enzymatic reactions, the products or substrates of which are thiols. (Khrantsov et al. 1991, Bioch. Bioph. Res. Comm., 179, 520). It has been shown that the treatment of proteins modified by RS-SR with reduced glutathione leads to removal of the radical from the proteins (Khrantsov et al. 1991, Soviet journal of Biochemistry 56, 1100). In case of NADPH-cytochrome P-450-reductase this reversible modification results in reversible inhibition of enzyme activity and demonstrates the possibility of regulation of enzyme activity using this method.

## *New Spin Traps based on 2H-imidazole-1-oxides*

A series of 2H-imidazole-1-oxides was tested as potential spin traps in chemical, photochemical and enzymatic systems (Dikalov et al. 1992, Izv. Akad. Nauk, ser. chim., 5, 1064). The spin adducts of these spin traps with O-, C-, S-centered radicals is shown more distinguished in EPR spectra compare with DMPO and PBN adducts. They have no paramagnetic impurities in storage samples and solutions. The spin traps with different structural parameters as lipophilicity, charge and others are available.

For more information, contact:

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## **THE COMPUTER CORNER**

*Edited by Philip D. Morse II and Keith P. Madden*

The *Computer Corner* is a new column in the EPR Newsletter which is dedicated to all computer-related aspects of EPR spectroscopy. We are soliciting articles, comments, tips, and so forth for this column. Please send submissions to Reef Morse (E-mail: reef@xenon.che.ilstu.edu) or Keith Madden (E-mail: keith.p.madden.1@nd.edu). Our full addresses are listed at the end of this column.

There is a growing number of programs which are available over the INTERNET. The best example of this is NCSA Telnet, now in version 2.5 for the Macintosh, which now allows you to *initiate* an FTP (File Transfer Protocol) session. This allows you to exchange files with any computer which will let you send or receive files.

Typically, an FTP server is set up to allow you to receive files. We logged onto a computer at NIEHS where Dave Duling has deposited some EPR data manipulation software, and we describe below what we got.

Since we used the INTERNET number 157.98.8.200 (from a Macintosh running TELNET 2.5), we entered that number into its session name and clicked on the FTP box. The following dialog is copied from that session. We have put all the information that we typed in **bold mode** to better show what we typed, and what the computer gave us back.

Note well: Comments in parentheses are NOT to be typed in!

220 epr0-lmb FTP server (WinQVT/Net v3.1) ready.

**user anonymous** (this is how you log in to the anonymous FTP server)

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331 Guest login OK, please send real ident as password.  
(the FTP server will not echo this line. You should type  
your actual E-mail address here).

230 Guest login OK, access restrictions apply.

**ls** ( get a listing of the directories)

200 PORT command successful.

150 Opened data connection for 'ls'

(138.87.128.125,52960) (0 bytes).

./

../

uploads/

misc/

qvtnet3/

chart/

epr/

226 Transfer complete.

**cd epr** (change the directory)

250 CWD command successful. (note, this would be a  
good place to run ls again to see what files are  
available.)

**binary** (downloading of non-text files should be done in  
binary mode)

200 Type set to I, binary transfer mode.

**mget \*.zip** (get all the files that are in ZIP compressed  
format. These can be decompressed using PKUNZIP.EXE  
which is found in the /misc directory.

200 PORT command successful.

150 Opened data connection for 'ls'

(138.87.128.125,52977) (0 bytes).

226 Transfer complete.

Receiving epr1.zip

200 PORT command successful.

150 Binary data connection for epr1.zip

(138.87.128.125,52970) (350404 bytes).

226 Transfer complete.

Receiving epr2.zip

200 PORT command successful.

150 Binary data connection for epr2.zip

(138.87.128.125,52969) (192100 bytes).

226 Transfer complete.

Receiving powfit.zip

200 PORT command successful.

150 Binary data connection for powfit.zip

(138.87.128.125,52968) (107596 bytes).

226 Transfer complete.

Receiving eprdata.zip

200 PORT command successful.

150 Binary data connection for eprdata.zip

(138.87.128.125,52967) (24410 bytes).

226 Transfer complete.

Receiving eprman.zip

200 PORT command successful.

150 Binary data connection for eprman.zip

(138.87.128.125,52966) (249108 bytes).

226 Transfer complete.

**ascii** (now get all the text files)

200 Type set to A, ASCII transfer mode.

**mget \*.txt**

200 PORT command successful.

150 Opened data connection for 'ls'

(138.87.128.125,52965) (0 bytes).

226 Transfer complete.

Receiving epr-db.txt

200 PORT command successful.

150 ASCII data connection for epr-db.txt

(138.87.128.125,52964) (94237 bytes).

226 Transfer complete.

Receiving eprbyftp.txt

200 PORT command successful.

150 ASCII data connection for eprbyftp.txt

(138.87.128.125,52963) (2937 bytes).

226 Transfer complete.

Receiving readme.txt

200 PORT command successful.

150 ASCII data connection for readme.txt

(138.87.128.125,52962) (1776 bytes).

226 Transfer complete.

Receiving stdb.txt

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Telephone: 49 721 5161 141; FAX: 49 721 5161 237.

In USA, contact Dr. Arthur Heiss, 19 Fortune Dr., Manning Park, Billerica, MA 01821. Tel: 508-663-7406; FAX: 508-667-3954.



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200 PORT command successful.  
150 ASCII data connection for stdb.txt  
(138.87.128.125,52961) (4391 bytes).  
226 Transfer complete.  
**bye** (exit from FTP and return control to your computer).

Now that you have the software, run PKUNZIP to decompress the files (for example, type PKUNZIP EPRMAN.ZIP), and you are in business.

*What follows is a review by Keith Madden of the software that we downloaded.*

For those of you who have access to Internet, there are a number of excellent software packages which allow you to analyze EPR data.

For example, we recently downloaded the EPR software package available via anonymous FTP from the Free Radical Metabolite Research Group, Laboratory of Molecular Biophysics, National Institute of Environmental Health Sciences, NIH. This package, written by David Duling and co-workers, is an example of the excellent PC compatible software available on Internet. This package consists of three zipfiles. The first contains data acquisition software for use with Varian and Bruker EPR systems (SCAN, ER200). The second zipfile contains the spectrum manipulation and fitting programs, with an instruction manual. The umbrella program for importing data files, basic spectral manipulation, measurement of spectral parameters, and spectrum plotting is EPR.EXE, which provides access to the rest of the analysis package via a spectral clipboard system. This clipboard serves as a spectrum import / export facility during the steps of the analysis. The other programs provide autocorrelation analysis (AUTOCOR), FT filtering / processing (FTEPR), and spectrum synthesis with spectral parameter optimization (SIMEPR, TUNE, TUNEX). The third zipfile provides sample data sets for the various components of the package. We haven't tried the data acquisition programs yet, but have made extensive use of EPR.EXE and SIMEPR in recent weeks.

The EPR program is a menu-driven DOS graphics mode program for importing, exporting, displaying and manipulating EPR data files. It imports data files in ASCII format (1 or 2 columns, EPR signal or field / EPR signal), an HP workstation compatible format, Bruker ESP300 format, and a binary format compatible with the included data acquisition programs. For those of us using lab-built EPR systems, the two column ASCII format is very handy for introducing a spectrum into the LMB system. Once the spectrum is converted

by EPR.EXE, a wide variety of spectral manipulations, including baseline correction, filtering, peak picking, hyperfine coupling constant extraction, and calculation of component spectrum ratios (in spectra composed of multiple species). The processed spectra can then be stored in the original native file format, plotted as a hard copy (the ubiquitous HP 7475A is the supported plotter), or pasted onto the clipboard for further processing. The clipboard, which can hold up to 99 spectra, is the medium of communication between the EPR program and SIMEPR.

SIMEPR is a DOS graphics mode program for spectral simulation and parameter optimization. The simulation model is suitable for first-order isotropic spectra, although an option is available for simulation of the nuclear spin state dependent linewidth variation in nitroxide (aminoxyl) free radicals. Since SIMEPR accommodates spectra containing multiple species, one or more sets of hyperfine coupling, g factor, and linewidth estimates can be entered into the program. Notably, the program also uses signal channel time constant and modulation amplitude information to produce the simulated spectrum, which should improve the accuracy of the calculated line widths. At the end of the optimization process, both the experimental spectrum and the simulation are displayed in a dual window screen, allowing quick visual comparison of the result. A menu option provides display of the residual spectrum, along with goodness-of-fit statistical indicators (the sum of squared residuals and correlation constant). An ASCII file of final fitting parameters is produced directly by the program, with the simulated spectrum available via the clipboard system.

I found the overall look and feel of the program excellent, with the menu structure well designed; with less attention to detail, a set of programs as capable as these could have had hopelessly complex menus. I had no problem using the package, but for those with questions the provided manual (in Microsoft Word for Windows format) is clear, and provides helpful details, as well as references for the manipulation algorithms employed, many of which were developed at LMB for spin adduct analysis. The INTERNET address for downloading is 157.98.8.200, in user account anonymous. The best time to download the software is after 5 pm and on weekends, since this computer is used for other purposes during normal business hours. Comments and/or questions on these software packages can be referred to David Duling on INTERNET at "duling@vaxc.niehs.nih.gov".

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We have received some correspondence about software that the EPR community would like to see. Following is a letter from Les Sutcliffe about what he feels is necessary in the EPR field:

\*\*\*\*\*

From: Prof H Sutcliffe <chs11s@surrey.ac.uk>  
Subject: Re: EPR software  
To: reef@xenon.che.ilstu.edu  
Date: Mon, 18 Jan 93 9:19:27 GMT

Dear Reef

I notice that you and Dick Cammack are looking into software. I am surprised that it did not state in the Fall EPR Newsletter that this was started more than two years ago by the ESR Discussion Group of the Royal Society of Chemistry and that Dick was the coordinator. {Aside by Editor - Previous issues of the Newsletter did report this fact.}

What I would like to see, as you would guess, is that all programs should be written to run on PCs since they are now so powerful. Two types of such programs are needed urgently (i) an isotropic ESR spectral simulation which includes chemical exchange between at least two sites (ii) an isotropic ESR spectral simulation for non-exchanging systems but which iterates on experimental data.

Ironically enough, the Belford-Nilges powder spectrum simulation runs like a dream on a 486.

\*\*\*\*\*

A list of available software may be obtained directly by electronic mail. Dr. Frank Auteri has installed the database on an anonymous FTP server at the Illinois EPR Research Center (IERC), so that it can be downloaded directly. Users: Note that it occupies 90 kilobytes of space. We give access instructions modified from those in the last issue of the EPR Newsletter.

*Here is how to access the database:*

From your Internet site or any network service which supports ftp, do the following (don't enter the quotes):

- 1) Type "ftp rlb6000.scs.uiuc.edu" (or, if that doesn't work, "ftp 128.174.90.135").
- 2) At the user prompt, enter "anonymous"
- 3) For the password, enter your full E-mail address (for example, auteri@rlb6000.scs.uiuc.edu)
- 4) Now you should be logged in. If this is your first time logging in, you should first download the information file as follows: "get README.EPR" (Do use the capital letters).

Next, you should "get eprsoftwr.txt"

5) Type "quit" to end session. The two files now should be downloaded to your system. Read the README.EPR file first. If you have trouble, send E-mail to auteri@rlb6000.scs.uiuc.edu or phone Frank Auteri at (217) 333-3776. Send Frank the following if you wish to get onto the IERC E-mail list: Name, full E-Mail address (also TCP/IP address if known), alternate E-Mail address (also TCP/IP address if known), Mailing Address and Phone.

\*\*\*\*\*

We encourage your comments regarding any software product you are using, whether free or purchased. We would like to know what software is actually in use. We will disseminate this information to help people become more aware of what is available. Commercial vendors are also invited to reply. If you wish to contribute to this column or provide any pertinent information about software, please contact us.

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[Chem. Dept., Ill. State U., Normal, IL 61761, USA]  
(Keith P. Madden) keith.p.madden.1@nd.edu  
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(Dick Cammack) udbc033@hazel.cc.kcl.ac.uk  
[Dept. Bioch., Kings College London, Campden Hill Rd., Kensington, London W8 7AH, UK]

---

## TIPS & TECHNIQUES

### ACOUSTIC EPR FOR NON-CRYSTALLINE SAMPLES:

#### A SUGGESTION FOR A NEW PROBE BASED ON THE ACOUSTIC MICROSCOPE

*Chris Bender*

*Biotechnology Resource in Pulsed EPR  
Einstein College of Medicine, Bronx, NY 10461*

One of the lesser known techniques of electron spin resonance is the acoustic method, which, in some respects, reverses the energy pathway of a conventional EPR experiment. Normally, during an EPR experiment, the sample is irradiated with microwave radiation, and the energy is disposed through the lattice via phonon modes coupled to the electron spin. The acoustic method uses ultrasound to excite the lattice vibrations directly, and the EPR resonance condition is identical to that of the conventional EPR experiment,  $h\omega = g\beta H$ , where  $\omega$  is the ultrasonic frequency.

The acoustic method has a number of interesting features and unique applications (*cf.* ref. 1). Since it is a direct probe of the phonon modes coupled to the

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electron (or nuclear) spin, the method permits one to gain more insight into spin lattice relaxation processes and the rate constants that govern them. The selection rules of magnetic dipole transitions in an rf field are also lifted, therefore one can observe transitions that are ordinarily forbidden in conventional EPR. These two features could, for example, be exploited to measure cross relaxation rates of spin systems.

Unfortunately, one feature limits the applicability of the acoustic technique: the acoustic energy must be physically coupled to the sample. In other words, a transducer must make physical contact to the sample. In most acoustic spectrometers, this transducer is a piezoelectric crystal, and, as one might guess, the key to success in this experiment is mating the transducers to the sample. As a result this technique has been traditionally applied to thin films and crystals, with only rare reports of its use on disordered materials. The prospects for using acoustic EPR by someone whose interest is in biological, or disordered systems in general, are bleak.

An alternative to the conventional means of constructing acoustic transducers may be found in the literature of acoustic microscopy. Modern probeheads for the acoustic microscope consist of a piezoelectric crystal that is affixed to a cylindrical transducer. The composition of the transducer depends on the frequency of the ultrasound and is chosen on the basis of its attenuation properties; quartz or glass are typical materials. The end of the transducer cylinder opposite to the piezoelectric crystal has a concave pocket in its face. Once again, the size of this semispherical cavity is determined by the frequency at which the transducer will operate (modern acoustic microscopes operate at frequencies as high as 3 GHz).

The electronics of an acoustic microscope resembles that of an EPR spectrometer (cf. refs. 2 & 3). One interesting variation of the instrument design is also very painless as regards development and construction: a network analyzer and S-parameter test set are used as a 'bridge' and the measured quantity is the ratio of the reflected and incident waves as a function of frequency<sup>4,5</sup>.

A diagram of the probehead that shows its relationship to the sample is illustrated in figure 1. The acoustic lens is roughly the same size as a conventional microscope objective lens, and its set-up is somewhat similar to that of an oil immersion microscope objective. The lens' face containing the concave pocket makes acoustical contact to the sample via a coupling medium,

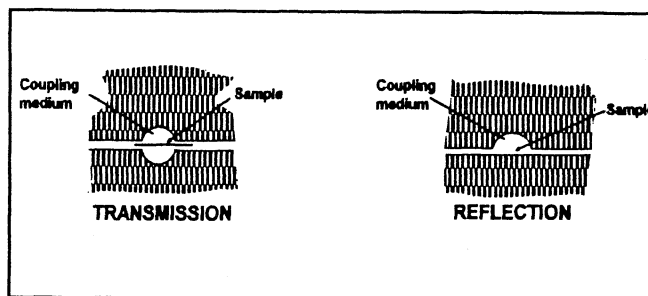


FIGURE 1: Probehead of Acoustic Microscope showing lens, coupling droplet of water, and sample (after ref. 4).

which fills the region between the semispherical cavity and the sample. It is the attenuation properties of the coupling medium (usually water) that determines the size of the semispherical cavity. The configuration of the cavity focuses the acoustic wave onto the sample, and an image is obtained by scanning the focusing cavity over the planar sample (the microscope works much like a scanning tunneling microscope).

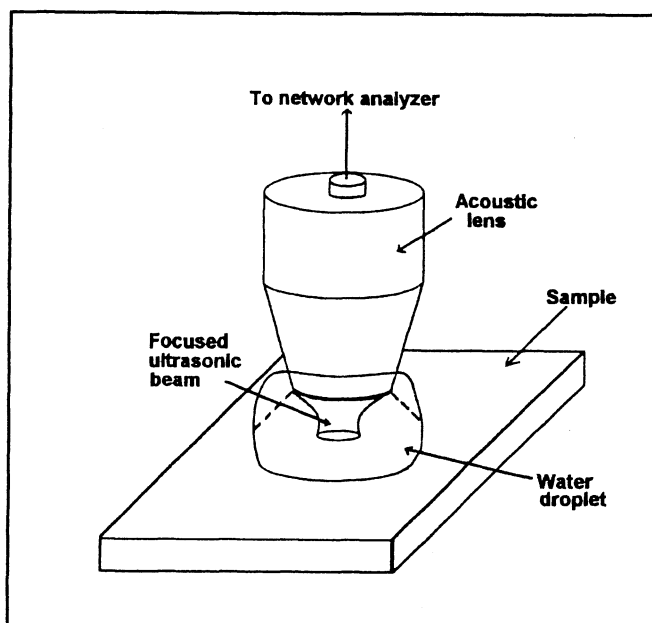


Figure 2: Cross sectional view of acoustic probehead/sample interface showing reflection and transmission configurations (adapted from ref. 6).

If one is willing to let one's imagination run wild, these probeheads might make feasible probes for acoustic EPR. Both transmission and reflection spectrometer configurations can be adapted from the probeheads illustrated in Figure 2. It seems as though it might be possible to load a solution sample into the spherical cavity of the transducer/probehead and operate the microscope as an EPR spectrometer if supplemented with a magnet.

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There is, however, a catch. I visited Briggs' laboratory in Oxford, where one of the Leitz acoustic microscopes was in use and found that the commercial 3 GHz probe is constrained to a cavity diameter on the order of 100 micron because of the attenuation loss of water. One needs to drop down to about 400 - 500 MHz before liquid sample volumes begin to approach those that we commonly use in an EPR. The sample size constraint is only due to the manner in which the microscope operates; an EPR does not have to scan, so the sample can be elongated. In other words, the semispherical cavity can be replaced by a long cylindrical tunnel analogous to the commonly used quartz sample tube that we use for conventional solution EPR. Admittedly, sensitivity of such an acoustic spectrometer is going to depend on whether the high filling factor can offset the small sample volume. By use of an elongated transducer it may be possible to work with reasonable sample volumes at 3 GHz.

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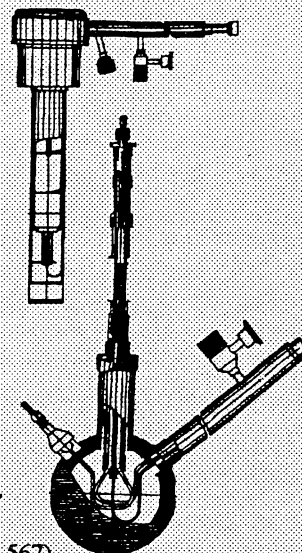
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### MODULAR DESIGN FOR EPR INSTRUMENTATION: A PEDESTRIAN LOOK AT VXI AND VME

*Chris Bender*

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*Albert Einstein College of Medicine*

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*Bronx, NY 10461*

In general, a spectrometer is often a collection of disparate linked components, for example, a microwave source, detection system, etc. In our own system, the microwave pulse logic is generated by three BNC pulse generators that provide programmable delays, and a custom logic box for producing the requisite experimental pulse sequence; data acquisition is via a home-built boxcar signal averager; and the entire mess comes under the control of a computer. One of the instrumentation projects in which I have been interested has been the integration of all these necessary functions into one unit. The motivation is provided by an aspiration of having a somewhat more manageable

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instrument that also provides flexibility for methods development.

It often happens that in the course of designing and building new instrumentation, one discovers a better way to have done the original job. My original idea for simplifying our spectrometer was to build a system onto the new NeXT computers. The rationale behind this plan was that the basic 'cube' contains a single board computer on an 11x11-inch Eurocard. The computer itself consists of a Motorola 68040 processor plus a 56001 digital signal processor (DSP), so you have the power of the advanced 68000 processor and a second processor that can be dedicated to array processing (e.g. the FFT and other transforms - the computer apparently was designed for sound and image processing applications) for pulsed EPR. The so-called cube is also ideal as a platform for instrument building because it can take three additional Eurocards and has a 300W power supply. Other useful features are its large memory and, on earlier models, a CD-ROM drive that was well suited to the mass storage of data files. Lastly, the computer is black, so it meets one of the many stringent criteria for New York chic.

The three slots in the NeXT cube provided ample space for a pulse forming unit and a signal processing unit; time and space permitting, a fast oscilloscope was planned for the third slot. I plan to write further on the NeXT architecture at some time. However, since I began this project, I've discovered a better method that also allows one to integrate the microwave circuits.

Test and measurement instrumentation for the electronics industry has become increasingly computer-based, and the designers of these instruments have been faced with problems similar to those of spectroscopists. For obvious reasons, an electronic specialist does not want to build interfaces and write code for a computer and many different test instruments whose recorded data

are to be integrated in the final analysis. The answer to this problem has turned out to be what is called VXI, which is an instrumentation bus standard that evolved from VME.

The idea should not be new to EPR users. Commercial EPR spectrometers are built along this philosophy; the instruments are basically desk-like enclosures that house several plug-in modules that each perform some task (e.g. field control, phase-sensitive detection, etc.). Only the bridge, which has rather unique shielding requirements, is often a remote unit.

VME originally appeared as a modular system for assembling computers and some forms of dedicated instruments. Its principal advantage was that the modular components allowed one to custom design the computer architecture specific to one's needs. A consortium of companies extended this concept to modular instrumentation, hence the VXI standard. The modules plug into standard rack units that resemble NIM bins, however VXI and VME differ from the NIM bins in that there is a computer-controlled bus in the backplane. The basic architecture consists of a single board computer that occupies slots and a bus controller. Beyond this basic configuration, one is free to add on as one pleases. Both VME and VXI modules are built on standard Eurocards, the size (i.e. height) of which determines a letter class. In general, VXI cards are larger to allow for space requirements of instrumentation, although VME-B (9.2 x 6.3") and VXI-C (9.2 x 13.4") modules fit the same size backplane. Unlike VXI, VME leaves some of the pins in the backplane undefined, and therefore VXI is categorized as a logic subset and an electro-/mechanical- superset of VME. Only one slot is defined in the mainframe, and this so-called Slot 0 is devoted to system management. The Slot 0 module can house a full computer, but at the

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Published at the Illinois EPR Research Center (IERC), Urbana, IL 61801, USA

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very minimum, it must supply timing and module identification for the bus.

A spectrometer is rather easy to put together from commercial components. A computer is pretty much a given, but beyond that there are a number of instrument options that enable one to custom design a spectrometer. For example, VXI microwave sources are available from Racal-Dana, Gigatronics, and EIP that operate over several bands. There is also a wide range of test instruments (e.g. EIP counters, HP and TEK scopes, etc.) that can fill out the regimen of standard requirements. The field modulation driver and phase sensitive detector (lock-in) of a conventional cw-EPR is tough to imagine as being available as a single module, although I did find a device called a 'frequency response analyzer' (Schlumberger) that, as far as I can tell, does the same thing at frequencies up to 20 kHz (provision for an external synchronizer is also featured). A list of sources is provided at this article's conclusion.

Some spectrometer components currently cannot be found ready made; for my own needs, this would include the logic modules and most of the microwave circuitry. The line of products includes prototyping modules, for example, Racal-Dana manufactures prototype modules for both digital and microwave/rf circuits; the latter have special shielding. Likewise the rack (i.e. mainframe) can be bought from Racal-Dana as a standard or microwave/rf shielded unit.

The VXI architecture is designed for computer integration. The most convenient arrangement is the so-called 'embedded computer'- i.e., one that fits into the 0 slot of the mainframe. Many VXI manufacturers can provide their own computers for the slot 0 controller. Alternatively, one can interface the VXI mainframe to existing computers by using one of several interfaces. My 1992 National Instruments catalog lists VXI interfaces to IBM PC/AT and PS/2, Macintosh II, Sun SPARC station, and IBM RISC 6000 systems. There is also a GPIB/VXI interface. Interface modules occupy slot 0 as in the case of a true slot 0 computer.

One can combine VXI and VME boards and thereby exploit the extensive VME capabilities of Motorola. The VME-B computer modules will fit the VXI-C chassis with the assistance of an adapter that gives them added depth. The Motorola monoboard computers are available based upon the 6800, 68000, RISC, and CISC processors. Motorola provides software support; Fortran and C are offered in a UNIX operating system environment, although my product guide is more than a year old. Additional boards are available that permit add-on memory, digital signal processors, I/O ports, therefore one can custom configure the computer to suit one's needs.

I do not know of any VXI monoboard computers that currently feature an on-board DSP processor, but most computer manufacturers can supply DSP prototype or add-on boards. National Instruments produces a series of SCXI (Signal Conditioning eXtensions for Instrumentation)

modules for signal processing, but they seem to be more akin to NIM modules than VXI. DSP kits can be had from Analog Devices, Burr-Brown, Texas Instruments, and Motorola.

Finally, I should warn the reader that VXI components offer no benefits with regard to cost. According to most of the sales reps that I have consulted, volumes are not yet great enough to bring down prices. The advantage of VXI, as I see it, is its flexibility for laboratories, such as ours, where various experiments put widely different demands upon our instruments and where methods development is the norm. The drawback, of course, is that one will have to write application specific software and build some modules, therefore I do not recommend VXI instruments for those whose needs can be satisfied by a commercial spectrometer. On the other hand, for instrumentation developers, VXI offers great advantages over hacking up and modifying old Varians for which parts are becoming scarce.

## SOURCES OF VXI-BASED COMPONENTS

The following is a non-comprehensive listing of manufacturers of VXI instruments:

- Computers - Hewlett-Packard, National Instruments, Racal-Dana, Tektronix
- Microwave Sources - Racal Dana, EIP, Gigatronics
- Oscilloscopes - Tektronix, Hewlett-Packard
- Prototyping - Racal-Dana (Digital & RF), Tektronix
- Timers/Counters - Tektronix, Hewlett-Packard, EIP, Racal-Dana
- Power Meters - Hewlett-Packard, Gigatronics

NOTE: ENDOR users might want to know of a new broadband solid state amplifier, Model 50A220, by Amplifier Research. It features a 10 kHz to 220 MHz bandwidth (continuous) and power rating of 50W (47dB gain). The listed price, \$4700, makes it a good low-cost alternative for users not requiring a great deal of power.

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## A SIMPLE ARRANGEMENT FOR ESR MEASUREMENTS IN Q-BAND NEAR 77K

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Hessische Str 1-2, 0-1040 Berlin, Germany, &  
W. Hermann, Forschungsstelle für ortsauflösend  
Meßtechnik e.V., Rudower Chaussee 6  
0-1199 Berlin, Germany*

### Introduction

Routine ESR examinations at fixed temperatures in X-band are often carried out in dewar vessels for various applications.

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They allow fast and safe measurements at at least two different temperatures (i.e., 77K and 300K) with nearly no changes in matching of the cavity and sensitivity of the spectrometer.

There is an easier access to the measurements of paramagnetic centers with short relaxation times; the overall temperature dependence (particularly at deviations from Curie's law) reveals the existence of magnetically ordered phases. Exchange coupled spin systems can be easily identified; thus more specific and detailed examinations can be done. Samples with remarkable ionic conduction and solutions in polar solvents can be measured by means of ESR spectroscopy after freezing. Short-lived paramagnetic intermediates, e.g., produced after optical or  $\gamma$ -irradiation, can be examined at low temperatures without difficulties, as can the angle-dependence of spectra of nonisotropic samples.

Undoubtedly, the combination of these advantages with measurements at Q-band frequencies of about 34 GHz is valuable, because it not only allows comparisons with X-band spectra, but also provides considerable support for the assignment of spectra [1].

A literature review provides several descriptions of low-temperature arrangements for measuring at Q-band frequencies which are usually adapted to specific applications. There are different arrangements from cryostats with fitted cavities for temperatures from 4 to 300K, partly including auxiliary devices for optical excitation, mechanical influences, to simple apparatuses to lower the temperatures of samples during Q-band measurements [2-5].

The present note shall introduce an additional, not yet described, simple arrangement which was applied to a powder sample of guanidinium hexafluoro aluminate,  $\text{Gu}_3\text{H}_3\text{MF}_6$ . Also, the temperature effect on intensity and zero field splitting of  $\text{Cr}^{3+}$  dopant was demonstrated [6].

## Experimental

The experiments were carried out with an ERS 230 spectrometer equipped with a microwave bridge QG and a cylindrical cavity ZSQ 19 (all from ZWG, AdW), with HF modulation (50 and 100 kHz).

As shown in fig. 1, the sample is located at the bottom tip of a specific finger dewar — (diameter of the inner tube: 1.2 mm; max. sample volume:  $3.4 \text{ mm}^3$ ). The (outside) diameter of the outer tube is 3.5 mm. This made it necessary to widen the the cavity openings for inserting the samples to 3.5 mm. The sensitivity of the arrangement has been reduced by about 'one unit' altogether (because of the loss in quality and partial mismatching). The dewar can be used for examinations of powders, crystals, and frozen solutions, respectively. To calm down the boiling of the liquid nitrogen and to simplify the change of samples, they could be fixed with quartz or glass fibers.

The dewar itself is mounted on the cavity by means of a ground glass neck which guarantees safe fitting and reproducibility of the measurements. The inner part of the ground-in joint is part of the outer wall of the dewar itself. Tuning to the klystron frequency is done by shifting the bottom part of the resonance cavity using a micrometer screw. The matching can be done by means of a coupling pin within a coupling iris. The arrangement has been successfully applied to identify the two non-equivalent  $\text{Cr}^{3+}$  centers in hexafluorometallates which have different temperature-dependent fine-structure splittings.

The advantages of this arrangement are:

- \* The sample is directly placed into liquid nitrogen;
- \* Similar matching and sensitivity at all temperatures between 77K and 300K;
- \* Simple changes of the samples;
- \* No additional requirements to the microwave bridge; and

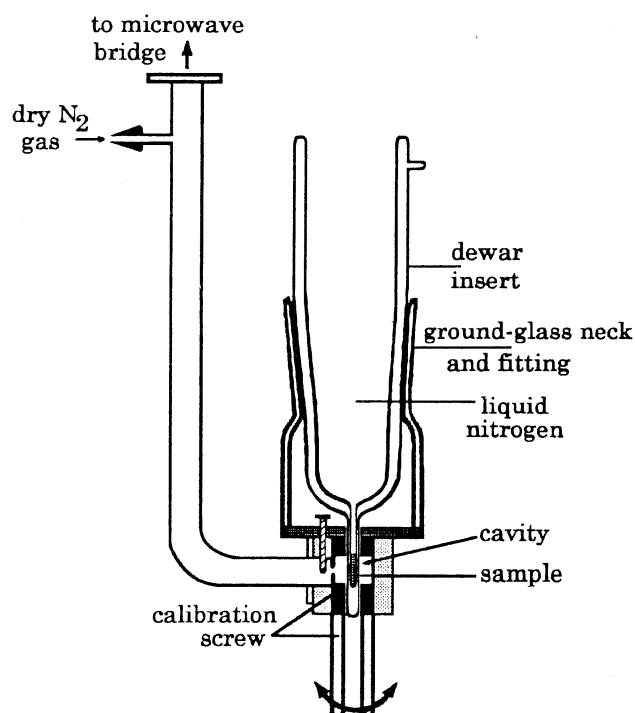


Fig. 1. Arrangement for ESR measurements in Q-band near 77K.

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Published at the Illinois EPR Research Center (IERC), Urbana, IL 61801, USA

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\* Optical excitation is possible.

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## NEWS FROM EPR CENTERS

### FROM the NATIONAL BIOMEDICAL CENTER FOR SPIN TRAPPING AND FREE RADICALS:

Because of a conflict with the forthcoming International Conference on Superoxide and Superoxide Dismutase in Kyoto on October 11-15, 1993, we had to change the date of the next spin trapping symposium. Also, in order to encourage papers on EPR spectroscopy of organic radicals of biological significance, e.g. tocopheroxyl, the title, too, was changed. The 4th International Symposium on Spin Trapping and Organic EPR Spectroscopy with applications in Chemistry, Biology and Medicine will be held on October 25-28, 1993 at the Oklahoma Medical Research Foundation in Oklahoma City, Oklahoma (see first announcement and preliminary registration information elsewhere in this Newsletter). Please note the following name change: The National Biomedical Center for Spin Trapping and Free Radicals is located within the Free Radical Biology and Aging Research Program (formerly Molecular Toxicology Research Program) of the Oklahoma Medical Research Foundation. Director: Edward G. Janzen, Ph.D. Inquiries should be directed to Audrey Winkles, OMRF, 825 NE 13th Street, Oklahoma City, OK, 73104, USA; ☎: 405-271-7570, FAX: 405-271-3980.

One of our objectives is to understand the features which influence the EPR intensity of a detected spin adduct obtained from biological spin trapping experiments. We are using the metabolism of  $\text{CCl}_4$  by rat liver to investigate this question. Quantitative EPR experiments are never

trivial for solution samples and quantitative spin trapping by EPR is not easy. For those involved in *in-vivo* spin trapping we ask that experiments be repeated a number of times to see whether the EPR spin adduct intensity is consistent. The best we have been able to do with 10 rats treated exactly the same way with PBN and  $\text{CCL}_4$  is  $\pm 40\%$ . Therefore interpretation of small changes in the EPR intensity of spin adducts obtained from biological samples should be approached with caution.

### FROM the NATIONAL BIOMEDICAL ESR CENTER in Milwaukee:

**TRAINING AWARDS** — As described more extensively in a previous issue (EPR Newsletter, v.3#4, Winter, 1991, p. 10), some \$500 awards are available to pre- and post-doctoral young investigators to help expenses for 2-week visits to this Center during 1993. The purposes are to provide training in modern EPR methods and to permit the investigators to use the unique facilities of the Center in their on-going research. The faculty and staff of the Center have expertise in the three main areas of EPR research: free radicals, spin labels and transition metals. To apply, send a letter and one-page research plan; student applications should be accompanied by a letter from the graduate faculty advisor. Address applications to Dr. Ching-San Lai, National Biomedical ESR Center, Medical College of Wisconsin, 8701 Watertown Plank Road, Milwaukee, WI 53226, USA; ☎: 414-266-4051.

### FROM the ILLINOIS EPR RESEARCH CENTER (IERC) in Urbana:

**TRAINING AWARDS** — During 1993, we hope to be able to fund a few awards in a graduate or postdoctoral student traineeship program similar to that offered by the Milwaukee center (see above). Trainees would take advantage of special facilities or expertise (multifrequency EPR, L- to W-band; S-band pulsed EPR; EPR *in vivo*; EPR imaging; metalloprotein EPR; ENDOR) available at the IERC. Direct inquiries to Becky Gallivan, Univ. of Illinois, 190MSB/MC-714, 506 South Mathews Ave., Urbana, IL 61801; ☎: 217-244-1186; FAX: 217-333-8868.

### FROM LIVERS (Laboratory for In-Vivo Electron Spin Resonance Spectroscopy) at the Ohio State University, Columbus, Ohio, USA:

This Laboratory, although not an official NIH ESR Center, is an NIH Research Resource Development, which may eventually attain full-fledged Center (Research



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Resource) status. Our laboratories are always open to collaborators, especially NIH grantees.

The laboratory currently contains the following equipment: Four ESR instruments: Varian E-4, E-9, E-12 and a V4502 magnet and power supply. Two of the instruments are dedicated L-band facilities for in-vivo ESR, while the third instrument may serve as either L- or X-band. The L-band instruments are fitted with a bridged loop-gap resonator or surface coil configuration. The X-band instruments are fitted with TE102 cavities and one Medical Advances X-band loop gap resonator.

The LIVERS principal investigator is Dr. Lawrence J. Berliner. The laboratory's associate director is Dr. Janusz Koscielniak, engineer.

✉ Lab: 614- 292-4178 or 292-9432; ✉ Office: 292-0134 (LJB) or 292-6161 (secretary). FAX: 614 292-1532.

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lberline@magnus.acs.ohio-state.edu.

Lawrence J. Berliner, Dept. of Chemistry  
The Ohio State University  
120 W. 18th Ave.  
Columbus OHIO 43210, U.S.A.

## BOOKS and PROCEEDINGS

A periodical devoted to emerging developments in VXI instrumentation is published by Bode Enterprises and entitled *VXI Newsletter* (\$195 per annum). The August issue, which is available at the single issue price of \$20, is an annual compilation of VXI instruments that are commercially available. Bode Enterprises may be contacted at 8380 Hercules Drive, Suite P3, La Mesa, CA, 91942, USA; ✉: 619-697-8790.

The following three books are available from World Scientific Publishing:

**FRONTIERS IN SOLID STATE SCIENCES, Vol. 2, MAGNETISM**, edited by L.C. Gupta & M.S. Multani. Contents: Spin Fluctuations in Heisenberg Magnets: Dynamic Critical Phenomena and Excitations in Quasi-Periodic Systems (S.W. Lovesey); Quenching of Spin Fluctuations by High Magnetic Fields (K.A. Gschneidner); Kondo Effect and Heavy Fermions in Rare Earths (B. Coqblin); Magnetic Interactions in

Correlated Electron Systems: High Pressure Investigations (J.D. Thompson); Hall Effect in Heavy Fermion and Mixed Valence Systems (A. Fert); Magnetic Properties of Uranium Based 122 Intermetallics (J.A. Mydosh); Inelastic Magnetic Excitations in Anomalous Rare Earth Intermetallics (E.H. Moritz); Neutron Scattering Studies of Magnetic Properties of Actinide Systems (G. Aeppli); m-SR Spectroscopy-Applications in Magnetic Materials and Heavy Fermion Superconductors (A. Schenck). 400 pp (approx.), US\$75; £47, Order #981-02-1212-7, Publication Date: Autumn 1992.

**MOLECULAR PHYSICS**, by Theodore Buyana (Mediterranean College, Athens). This book combines in one concise volume the diverse work of several similar books in the market. It is designed to serve the needs of graduates and undergraduates in physics, biochemistry and chemistry. Each chapter is self-contained. Illustrations accompany the material and some sample problems are worked out. Tedious mathematics that obscures the essence of physics is avoided. It aims at teaching, and not commenting on scientific knowledge. The material is kept as diverse as possible. It is mainly theoretical, but important experimental aspects are also discussed. It can be used both as a textbook and a reference. The main features covered include: Quantum-mechanical treatment of molecular physics; Theoretical treatment of molecular spectra and experimental techniques in spectroscopy; Interatomic interactions, potential, molecular stability, energy levels, bonds, rotational and vibrational states, anharmonicity, polarization. Theoretical consideration of real molecules. Resonance Methods (NMR, NQR, EPR and ENDOR. Theory, Experimental Apparatus, Techniques, Numerical Results, Applications and Utility Thereof). 300pp (approx), Order #981-02-0830-8, US\$48, £28 or #981-02-0831-6 (pbk) US\$24, £14, Publication Date: Autumn, 1992.

**RECENT ADVANCES IN MAGNETISM OF TRANSITION METAL COMPOUNDS**, a Festschrift in Honour of Professor K. Motizuki, edited by A. Kotani (Univ. Tokyo) & N. Suzuki (Osaka Univ.). This book is a Festschrift in honour of Professor Kazuko Motizuki on the occasion of her retirement from Osaka University. She has been active in a variety of branches of solid state physics and, in particular, has made an important contribution to the theory of magnetism. The book reviews recent advances in magnetism of transition metal compounds, both for itinerant electron systems and localized spin systems. For the former systems,

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band calculational methods, correlation effects, and theoretical aspects of photo-emission spectroscopy are reviewed generally, and then recent progress in the theoretical and experimental understanding of magnetic properties of various kinds of intermetallic compounds and intercalation compounds of transition-metal dichalcogenides are reviewed in detail. For the latter systems, attention is focused on quantum effects, frustration and competing interaction in low-dimensional systems. Main subjects treated in the book are Haldane gap-systems, singlet-ground-state systems, triangular spin systems, and quantum spin chains with competing interactions. Contents: *Electronic Structures and Magnetism*: Fundamental Physics, Intermetallic Compounds; Transition-Metal Dichalcogenides and Their Intercalation Compounds; *Localized Spin Systems: Low-Dimensional Systems and Quantum Effects*: Haldane Gap Systems; Singlet-Ground-State Systems; Competing Interaction and Frustration. 350 pp (approx), Order #981-02-1150-3, US\$78, £49. Publication Date: Spring, 1993.

To order any of the above books, contact one of the following: World Scientific Publishing Co., Inc., 1060 Main Street, River Edge, NJ 07661, USA ☎: 201-487-9655 or 800-227-7562; FAX: 201-487-9656. World Scientific Publishing Co., 73 Lynton Mead, Totteridge, London, N208DH, ENGLAND ☎: 44-81-446-2461; FAX: 44-81-446-3356. World Scientific Publishing Co. Pte. Ltd., Farrer Road, P.O. Box 128, SINGAPORE 9128, Cable: "COS PUB"; Tlx: RS 28561 WSPC; ☎: 65-382-5663; FAX: 65-382-5919. World Scientific Publishing Co. Pte. Ltd., 4911, 9th Floor, High Point IV, 45 Palace Road, Bangalore 560 001, INDIA Tlx: 0845-2900 PCO IN; FAX: 91-812-34-4593.

Due in 1993 from CRC Press, Inc.: *Synthetic Chemistry of Nitroxides*, L.B. Volodarsky, V.V. Martin, V.A. Reznikow, and V.I. Ovcharenko (Institute of Organic Chemistry, Russian Academy of Sciences, Novosibirsk). Contents: Introduction, The Main Routes to the Nitroxide Radical Center, Basic Principles of the Nitroxide Group Chemistry, Strategy of Nitroxide Synthesis, Synthetic Chemistry of Stable Nitroxides, Complexes with Metal Nitroxyl Group Coordination. For information, contact Barbara J. Caras, Managing Editor, Physical Sciences, CRC Press, Inc., 2000 Corporate Blvd., NY, Boca Raton, FL 33431.

**Biological Magnetic Resonance**, Edited by Lawrence J. Berliner, Ohio State University, and Jacques Reuben, Hercules, Inc. Research Center, Wilmington, DE: *Two new Volumes through #14 ("EMR of*

*Paramagnetic Molecules" have been announced. Volumes 10-14 will be described in the Spring, 1993 issue of the Newsletter.*

The following recent volumes are in print and available: **Volume 9**, an authoritative review of recent advances in state-of-the-art techniques: CORMA, solid state NMR, water suppression methods. Contents: Phosphorus NMR of Membranes (P.L. Yeagle); Investigation of Ribosomal 5S Ribonucleic Acid Solution Structure and Dynamics by Means of High-Resolution Nuclear Magnetic Resonance Spectroscopy (A.G. Marshall and J. Wu); Structure Determination via Complete Relaxation Matrix Analysis (CORMA) of Two-Dimensional Nuclear Overhauser Effects Spectra: DNA Fragments (B.A. Borgias and T.L. James); Methods of Proton Resonance Assignment for Proteins (A.D. Robertson and J.L. Markley); Solid-State NMR Spectroscopy of Proteins (S.J. Opella); Methods for Suppression of the H<sub>2</sub>O Signal in Proton FT/NMR Spectroscopy: A Review (J.E. Meier and A.G. Marshall); Contents of Previous Volumes; Index. 0-306-43341-9/248 pp./ill.1990/\$65.00 (\$78.00 outside US & Canada).

**Volume 8, Spin Labelling-Theory and Applications** presents a complete update of new theoretical aspects and applications of the spin-label method including full syntheses and citations for all spin labels discussed. This volume is intended not only to review the literature, but also to teach the principles. With this aim in mind an IBM-compatible diskette (MS-DOS 3.2) is provided as a supplement to Chapter 1. This diskette contains fast, accurate and ready to use software for slow motion simulations. 0-306-43072-X/650 pp./ill./1989 \$95.00 (\$114.00 outside US & Canada).

**Series Volumes 1-7 also available.** Contact Plenum Publishing Corporation, 233 Spring Street, New York, NY 10013-1578. United Kingdom: 88/90 Middlesex Street, London E1 7EZ, ENGLAND.

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## NOTICES OF MEETINGS

**SILVER JUBILEE MEETING OF THE ELECTRON SPIN RESONANCE GROUP OF THE ROYAL SOCIETY OF CHEMISTRY, March 29-April 2, 1993, University of Sheffield, ENGLAND.** Correction - This meeting was listed in a previous Newsletter with an incorrect date. Our apologies if anyone was inconvenienced.

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*Late arrival; notice added in press:* **THIRD NATIONAL CONVENTION OF THE ITALIAN ELECTRON SPIN RESONANCE GROUP, Alghero, September 24-27, 1993.** There will be oral presentations and posters. To be held at the hotel Corte Rosada on the bay of Porto Conte. Thematic sessions: Inorganic spectroscopy, Solid state and interfaces, Biological and medical applications, Methodologies of instrumentation and data treatment, Free radicals, Reaction mechanisms and kinetics in solution.

Organizing Committee: E. Alberico, M. Branca, A. Dessi, G. Micera, D. Sanna.

Secretaries for Meeting: Prof. M. Branca and Prof. G. Micera, Dipartimento di Chimica, Università di Sassari.

☎: 079/229555-229541-229487; Fax: 079/229559-212069.

DECnet: MVCHSS::GIRSE; Bitnet: GIRSE@MVCHSS.CINECA.IT

Registration forms due 31 May, 1993. Contact:

Segretaria del Terzo Convegno GIRSE

Dipartimento di Chimica

Via Vienna 2, 07100 SASSARI, ITALY

**EIGHTH SYMPOSIUM "SPECTROSCOPY IN THEORY AND PRACTICE," ORGANIZED BY THE SPECTROSCOPIC SECTION OF THE SLOVENIAN CHEMICAL SOCIETY, Bled, Slovenia, April 20-23, 1993.** Topics: 1. Atomic spectroscopy (absorption, emission, fluorescence). 2. X-ray spectroscopy and related techniques. 3. Mass and gamma spectrometry. 4. Laser spectroscopy. 5. Molecular spectroscopy (analytical aspects and structure). 6. ELECTRON PARAMAGNETIC RESONANCE OF LIVING SYSTEMS. Programme committee: M. Schara, K.F. Schnell (University of Regensburg), H.M. Swartz (Dartmouth Medical School), M. Šentjurc. Correspondence to: Doc. Dr. Marjan Veber, Slovenian Chemical Society, Hajdrihova 19, 61115 Ljubljana, Slovenia. ☎: 38-61-556-021; Fax: 38-61-263-285; E-mail: marjan.veber@uni-lj.si.

**HIGH-FREQUENCY EPR AND ELECTRON SPIN ECHO SPECTROSCOPY, Amsterdam, The Netherlands, April 21-23, 1993.** Electron Spin Echo and high-frequency Electron Paramagnetic Resonance Spectroscopy have shown a remarkable development in the last few years. The use of ever higher frequencies in combination with higher magnetic fields, the availability of novel pulse sequences and phase cycling techniques, and the improved time resolution have greatly broadened the range of applications. These may be found in physics, chemistry and biology. The Royal Netherlands Academy of Arts and Sciences recognizes the need for a thorough assessment of the recent experimental and theoretical advances in this field and has therefore decided to sponsor this workshop. Organizing Committee: E. de Boer (Univ. of Nijmegen), P. Gast (Univ. of Leiden), M. Glasbeek

(Univ. of Amsterdam), E.J.J. Groenen (Univ. of Leiden), A.J. Hoff (Univ. of Leiden), Y.K. Levine (Univ. of Utrecht), D.J. van Ormondt (Delft Univ. of Techn.), J. Schmidt (Univ. of Leiden), J.H. van der Waals (Univ. of Leiden), Ms. C.M. van den Heuvel (Royal Netherlands Acad. of Arts & Sciences), Ms. K. Postma (Royal Netherlands Acad. of Arts & Sciences). Invited Lecturers: M.K. Bowman (Argonne, USA), G.R. Eaton (Denver, USA), P. Höfer (Karlsruhe, Germany), G. Kothe (Stuttgart, Germany), Ya.S. Lebedev (Moscow, Russia), G. Millhauser (Santa Cruz, USA), K. Möbius (Berlin, Germany), J. Peisach (Bronx, New York, USA), A. Schweiger (Zürich, Switzerland), D.J. Singel (Cambridge, USA), H. Thomann (Annandale, USA), Y.D. Tsvetkov (Novosibirsk, Russia). For further information, contact the Royal Netherlands Academy of Arts and Sciences, Mrs. C.M. van den Heuvel, M.Sc., Kloveniersburgwal 29, 1011 JV Amsterdam, The Netherlands. ☎: 31-20-55-10-730; FAX: 31-20-62-04-941.

**1st INTERNATIONAL CONFERENCE OF THE POLISH ESR GROUP, ELECTRON SPIN RESONANCE OF RADICAL AND METAL COMPLEXES, May 31-June 4, 1993, Zakopane, POLAND.** Scope and Topics of the Conference: A broad range of problems which can be solved by use of ESR spectroscopy. Its application in such fields as chemistry, bio-chemistry, physics and bio-physics. Studies on paramagnetic intermediates generated by radiolysis and photolysis. Technical aspects and modern trends in ESR spectroscopy and related techniques. The program will include plenary lectures as well as oral and poster presentations. A short organizing meeting of the Polish ESR Group will be held during the Conference. Organizing Committee: Professor Andrzej Chmielewski, Assoc. Professor Hanna B. Ambroz, Dr. Zbigniew Zimek. For information, contact Hanna Ambroz, The Polish ESR Group (in organization), Institute of Nuclear Chemistry and Technology, ul. Dorodna 16, 03-195, Warszawa, POLAND.

**FIFTH CHIANTI WORKSHOP ON MAGNETIC RESONANCE, NUCLEAR AND ELECTRON RELAXATION, San Miniato (Pisa), Italy, May 30-June 5, 1993.** Chairpersons: I. Bertini (Univ. Florence), Conference Chairman; G. Bodenhausen (Univ. Lausanne), Program Chairman. Organizers: L. Banci (Univ. Florence), G. Valensin (Univ. Siena), and C.A. Veracini (Univ. Pisa). The Workshop aims to gather scientists involved with the theory and applications of nuclear and electron spin relaxation to dynamic and structural studies of molecular level. Topics to be covered will include biological systems, relaxation effects in MRI, solid-state studies, quadrupolar relaxation, ordered phases and experiments, the testing of theories against data obtained on model systems and

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computer simulations of molecular dynamics. At the moment the following scientists have accepted invitations to participate: K. Akasaka (Kobe), I. Bertini (Florence), J. Boyd (Oxford), W. Brudvig (New Haven), R. Bryant, (Charlottesville), L. Di Bari (Stockholm), J.W. Emsley (Southampton), M. Ernst (Zurich), C. Griesinger (Frankfurt), R. Griffin (Boston), L. Helm (Lausanne), J. Hyde (Milwaukee), S. Koenig (New York), J.P. Korb (Palaiseau), J. Kowalewski (Stockholm), Y. Levine (Utrecht), M. Levitt (Stockholm), Z. Luz (Rehovot), K. Möbius (Berlin), D. Neuhaus (Cambridge, UK), P.L. Nordio (Padua), G. Otting (Zurich), K.M. Salikhov (Kazan), A. Schweiger (Zurich), H. Shinar (Tel-Aviv), C. Springer (Stony Brook), J. Titman (Mainz), D. Torchia (Bethesda), G. Wagner (Boston), S. Wimperis (Oxford), T. Yamamoto (Tokyo).

Participants will have the opportunity to present talks or posters on work related to the themes of the Workshop and are requested to mail back the enclosed pre-registration form by January 31, 1993 and to submit an abstract (maximum 1 page A4 format typed single-spaced) not later than April 15, 1993.

The number of participants will be limited to 120 people. The registration fee is 250,000 Italian Lire for full participants and 120,000 Italian Lire for accompanying persons and includes attendance to all social events. The cost of accommodation in San Miniato in twin-bedded rooms is 700,000 Italian Lire and includes all meals.

For further information, please contact: Prof. Lucia Banci, Department of Chemistry, University of Florence, Via Gino Capponi 7, 50101 Florence, ITALY, ☎: 55-275-7550; FAX: 55-275-7555; TELEX: 570123 CHIMFI, Prof. Gianni Valensin, Department of Chemistry, University of Siena, Pian del Mantellini 44, 53100 Siena, ITALY, ☎: 577-298021; FAX: 577-28-0405, or Prof. Carlo A. Veracini, Department of Chemistry, University of Pisa, Via Risorgimento 35, 56100 Pisa, ITALY, ☎: 50-5872-66; FAX: 50-58-7260.

**INTERNATIONAL SCHOOL ON ESR DOSIMETRY, June 2-11, 1993, Elba International Physics Center (EPIC), Manciana Marina (Elba Island), ITALY.** Topics: Radiation Physics & Chemistry, Materials & Radiation Effects, Radiation Measurements, ESR Theory & Instrumentation, Instrumental Advances, Dosimetry for Radiation Processing, Dosimetry for Therapy, Alanine Dosimetry, Radiation Accident Dosimetry, Identification of Irradiated Food, Dating, Imaging. The school will be held in English. The final program, travel/accommodations information, and instructions on paying participants' fees will appear in the second announcement. For information, contact the school secretary, Paola Di Ciaccio, Physics Laboratory, Istituto Superiore di Sanita, Viale Regina Elena, 299, 00161 Roma, ITALY; ☎ 39-6-4990 (ext. 889); FAX: 39-6-4462872; E-mail: paolad@sanita.infn.it / paolad@issm. In the US, contact Marc F. Desrosiers, Bldg. 245, Rm. C229, Ionizing

Radiation Division, NIST, Gaithersburg, MD 20899, USA; ☎ 301-975-5639; FAX: 301- 869-7682.

**EMARDIS-93 (THIRD INTERNATIONAL WORKSHOP ON ELECTRON MAGNETIC RESONANCE OF DISORDERED SYSTEMS), June 7-14, 1993, Sofia, BULGARIA.** The aim is to cover all aspects of recent development in the theory, methodology, instrumentation, and experiments of electron magnetic resonance (EPR, ENDOR, ESE) spectroscopy of disordered systems in lectures, posters, and round-table discussions. Official language: English. Current plans are to start late on a Monday and finish early on the Friday. Later that day the Q-EPR Expert Meeting (see next announcement) will commence, and it will close on Monday after breakfast.

Short abstracts of the EMARDIS-93 papers will be available at the meeting; full papers based on the invited lectures will appear in a Proceedings.

Contact one of the following:

N. D. Yordanov (Convener) or M. Ivanova (Sci. Sec'y, Q-EPR), Institute of Kinetics and Catalysis, Bulgarian Academy of Sciences, 1113 Sofia, BULGARIA. Telex: 22729 echban. FAX: 3592-756-116 or 720-038; ☎: 713-2546 or 713-3917. or G. Gochev (Sci. Sec'y, EMARDIS), Department of Chemistry, Sofia University, 1 James Bouchier ave., 1126 Sofia, BULGARIA. ☎: 3592-62-561 ext. 223.

**FIRST INTERNATIONAL EXPERT MEETING ON QUANTITATIVE EPR (Q-EPR), to be held near Sofia, Bulgaria in June, 1993** immediately following the EMARDIS-93 workshop; see the announcement immediately above.

**SIXTEENTH INTERNATIONAL EPR SYMPOSIUM at the 35th Annual Rocky Mountain Conference, Denver, CO, USA, July 25-29, 1993.** To be held at the Hyatt Hotel in Denver. Prof. James S. Hyde will receive the Gold Medal of the International EPR Society. A technical Session in his honor is being arranged by Professors Wayne Hubbell and David Thomas. Papers and posters applying and extending Prof. Hyde's innovations are particularly solicited. There also will be general sessions as well as a special session on electrically-detected magnetic resonance arranged by Dr. James Stathis, IBM Watson Research Center. A PC-type computer will be available in the poster area for software demonstrations. For more information, contact Profs. Gareth R. Eaton or Sandra S. Eaton, Dept. of Chemistry, University of Denver, Denver, CO, 80208, USA. ☎: 303-871-2980 or 303-871-3102; FAX: 303-871-2254; E-mail: seaton@ducair.bitnet.

**TWELFTH ANNUAL SCIENTIFIC MEETING AND EXHIBITION, THE SOCIETY OF MAGNETIC RESONANCE IN MEDICINE, New York, New York,**

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**USA, August 14-20, 1993.** The Society invites submission of Abstracts to be presented in oral and poster sessions at the Twelfth Annual Meeting. Abstracts must contain new, previously unpublished material. There will be no Works-in-Progress this year. The deadline for receipt of Abstracts in the SMRM Business Office is April 27, 1993. Abstracts accepted for presentation will be printed in the *Proceedings of the Society of Magnetic Resonance in Medicine* (formerly titled *SMRM Books of Abstracts*).

Abstracts must be typed on official 1993 abstract forms. Detailed instructions are included with the forms. To receive abstract forms and instructions, contact the Society of Magnetic Resonance in Medicine, 1918 University Avenue, Suite 3C, Berkeley, CA 94704, USA ☎: 510-841-1899; FAX: 510-841-2340.

**SECOND FAR EASTERN CONFERENCE ON MEDICAL AND BIOLOGICAL ENGINEERING 1993, Beijing, CHINA, August 15-17, 1993.** The purpose of this meeting is to exchange information and encourage cooperative development of medical and biological engineering in the Far East and the other parts of the world. The theme of this conference is to look at high level science and technology, especially to accelerate the progress of medical and biological engineering and to promote medical care. For more information, contact Secretariat of 2nd FECMBE, c/o Chinese Society for Biomedical Engineering, 5 Dong Dan San Tiao, Beijing 100005, China.

**WORKSHOP ON IN VIVO EPR AND EPR STUDIES OF VIABLE BIOLOGICAL SYSTEMS, at the Dartmouth Medical School, Hanover, New Hampshire, USA, October 17-21, 1993.** Sponsored by the Illinois EPR Research Center (IERC) and held at the IERC Dartmouth site. The dates are set to coordinate with (immediately precede) the 4th International Symposium on Spin Trapping and Organic EPR Spectroscopy with Applications in Chemistry, Biology and Medicine. This meeting is aimed at bringing together members of all of the laboratories that are directly and indirectly applying EPR to viable biological systems, with a special emphasis on In Vivo EPR.

The format will stress discussion and sharing of information, in order to facilitate progress in this field. Attendance will be limited in order to achieve the goals of the workshop. **Those planning to attend are encouraged to fill out and send in the registration form on p. 27 of this Newsletter as soon as possible.** Housing is limited since the meeting is at the peak time for viewing autumn colors.

Correspondence on the meeting should be addressed to: Harold M. Swartz, M.D., Ph.D., Dartmouth Medical School, HB-7250, Strassenburgh 308, Hanover, NH 03755-3863, USA. Phone No: 603/650-1754; Fax No: 603/650-1935; E-Mail: Harold.Swartz@Dartmouth.Edu

**4TH INTERNATIONAL SYMPOSIUM ON SPIN TRAPPING AND ORGANIC EPR SPECTROSCOPY WITH APPLICATIONS IN CHEMISTRY, BIOLOGY AND MEDICINE, Oklahoma Medical Research Foundation, Oklahoma City, Oklahoma, USA, October 25-28, 1993 (Monday to Thursday).** Note that the name and dates of this symposium were changed since the announcement in the Summer '92 issue of the EPR Newsletter. It will immediately follow the IERC (Dartmouth) Workshop on In Vivo EPR and EPR Studies of Viable Biological Systems.

For this meeting, spin trapping is defined as any radical addition reaction (trapping) which produces an addition product (adduct) with the radical group attached. The structure of the adduct can be determined by any means, e.g. EPR, MS, NMR, etc. Hydrogen atom abstraction reactions are not considered spin trapping.

The organizing committee is as follows: Edward G. Janzen, Host; Keisuke Makino and Toshikazu Yoshikawa, Honorary Members; Coit M. DuBose, Robert A. Floyd, Yashige Kotake, Paul B. McCay, J. Lee Poyer, Lester A. Reinke and Mrs. Audrey Winkles, Secretary. This symposium will include oral and poster presentations. Abstracts are invited. Arrival and registration is planned for Sunday, October 24 with talks and poster, Monday through Thursday, October 25-28.

Suggested topics are:

- Kinetics and Rates of Spin Trapping
- Kinetics and Rates of Spin Adduct Decay
- EPR Spectroscopy of Spin Adducts
- Mass Spectrometry of Spin Adducts
- Synthesis of Spin Traps and Spin Adducts
- Biological Chemistry and Metabolism of Spin Traps
- Biological Chemistry and Metabolism of Spin Adducts
- Spin Trapping and Drug Toxicity
- Beneficial Effects of Spin Traps
- Pharmacology of Spin Traps and Spin Adducts
- Spin Trapping in CCl<sub>4</sub> Metabolism
- Spin Trapping in Phagocytosis
- Spin Trapping in Ischemia/Reperfusion
- Radical Trapping by Salicylate
- Nucleic Acids/DNA Radical Adducts
- EPR Spectroscopy of Organic and Organometallic Radicals
- Radical Reactions with Quinones
- Tocopheroxyl, Ascorbyl and "Paraquat" Radicals
- Other Topics

**For your convenience, a preliminary registration form is printed on p. 27 of this Newsletter.**

Contact: Free Radical Biology and Aging Research Program, Oklahoma Medical Research Foundation, 825 N.E. 13th St., Oklahoma City, OK 73104 USA. ☎: 405-271-7570; FAX: 405-271-3980.

**FIRST ANNUAL MEETING OF THE OXYGEN SOCIETY, Omni Hotel, Charleston, SC, USA, November**

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**12-16, 1993.** A session on the EPR Centers is included. Contact: Dr. Kelvin J.A. Davies, Chair, Dept. of Biochem. & Mol. Biol., Albany Medical College, Albany, NY 12208-3479, USA. ☎: 518-262-5315 (FAX 5689).

**INTERNATIONAL CONFERENCE on BIORADICALS DETECTED by ESR SPECTROSCOPY, Institute for Life Support Technology, Yamagata, Japan, June 12-16, 1994.** The organizers are Hitoshi Kamada (Yamagata Technopolis Foundation (YTF), president, and Hiroaki Ohya-Nishiguchi (YTF), general secretary.

The conference will treat an aspect of life-support technology with special attention to ESR spectroscopy including new technology and technology transfer, ESR imaging, spin trapping and labeling, metalloproteins, medical applications, antioxidants and food sciences, and characterization of bio-materials. The conference program will include opening lecture, plenary lectures, session lectures, invited reports, original research contributions, and poster session.

YTF is now organizing a world-wide research center for investigating bioradicals based on ESR spectroscopy, *Institute for Life Support Technology (LIST)*. The research center will be opened in April, 1993. Thus the conference has yet another meaning—namely, celebrating inauguration of the kernel of its researches on bioradicals.

The organizing committee will try to do their best in involving you in the warm and friendly atmosphere of Yamagata, offering the nature and natural foods most famous in Japan, *the other side of Japan*.

For more information please contact Dr. Midori Hiramatsu, Institute for Life Support Technology, Yamagata Technopolis Foundation, 683 Kurumanomae, Numagi, Yamagata 990, Japan, 81-236-44-8088; FAX: 81-236-44-9640.

**XXVII CONGRESS AMPÈRE ON MAGNETIC RESONANCE, Kazan, Russia, August 22-29, 1994.** The scientific program will include plenary lectures, symposia, and poster sessions covering the latest achievements in magnetic resonance (EPR & NMR) research. More details will be provided in the next Newsletter. Please send your notice of intent to participate to arrive by May 31, 1993. Send your name, address, phone, FAX, and E-mail to Dr. N.M. Suleimanov, Zavoisky Physical-Technical Institute, Sibirsky trakt 10/7, Kazan, 420029, Tatarstan, Russian Federation.

## POSITIONS OPEN

**POSTDOCTORAL FELLOWSHIP.** One position available in projects using EPR spectroscopy in viable biological systems *in vitro* and *in vivo*. Required:

background in EPR spectroscopy and/or working with viable cells and animals. Contact:

U.S. Army Medical Research Institute  
of Chemical Defense

ATTN: SGRD-UV-YY/Dr. Carmen M. Arroyo  
Aberdeen Proving Ground, MD 21010 USA  
☎: 410-671-3691; FAX: 410-676-7045

**POSTDOCTORAL POSITION IN BIOCHEMICAL EPR AND ENDOR SPECTROSCOPY.** A position is available for characterization of paramagnetic biomolecules by EPR and ENDOR spectroscopy. We are looking for an exceptionally able experimentalist with technical proficiency in microwave magnetic resonance. Prior experience with biological systems is useful but not a prerequisite. We use X- and Q-band ENDOR at cryogenic temperatures to probe the active sites in metalloproteins. A newly developed, ambient temperature stopped-flow EPR X-band system based on novel resonator technology is being used to follow rapid subsecond kinetics of radical species. Representative publications from recent years can be found in *J. Am. Chem. Soc.*, *J. Magn. Resonance*, and *Biochemistry*. The salary for this position will be at the NIH scale but is commensurate with experience. Applications will be considered after April 1, 1993. Candidates should submit a resume and the names of three references to:

Dr. Charles P. Scholes, Department of Chemistry  
State University of New York at Albany  
Albany, NY 12222, USA  
☎: 518-442-4551; FAX: 518-442-3462  
bitnet: cps14@Albnyvms.edu

**POSTDOCTORAL POSITIONS AT THE UNIVERSITY OF DENVER, Fall/Winter 1992.** Two postdoctoral openings are available immediately in our laboratory:

Position 1: The Postdoctoral Research Associate will design, perform, and interpret experiments involving electron spin-spin interaction in metallobiochemistry. A Ph.D., experience in handling metalloproteins, including purification and characterization, and sufficient background with spectroscopy to learn continuous wave EPR is required. Time-domain experiments will be performed in cooperation with other members of the research group. Experience with spin-labeling and hemoglobin is desired.

Position 2: The Postdoctoral Research Associate will design, perform and interpret EPR imaging experiments

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on conducting polymers and irradiated materials. A Ph.D. and knowledge of continuous wave EPR is required. Contact:

Gareth or Sandra Eaton, Department of Chemistry  
University of Denver, Denver, CO 80208 USA  
☎: 303-871-2980 (GRE); ☎: 303-871-3102 (SSE)  
FAX: 303-871-2254. E-mail: geaton@ducair.bitnet

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## SITUATION WANTED

Ph.D. student finishing his thesis in September 1993 on the EPR study of intermediates in electrochemical reactions seeks a postdoctoral position in an EPR laboratory.

Peter Rapta  
Dept. of Physical Chemistry  
Slovak Technical University  
CS-812 37 Bratislava, CZECHOSLOVAKIA

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## EQUIPMENT & SUPPLIES EXCHANGE

### AVAILABLE: GUNN OSCILLATOR REPLACEMENT FOR E4 KLYSTRON

Micro-Now has 150 mw Gunn Oscillator replacement.  
Contact: Mr. C. Arnow, Micro-Now Instrument Co.,  
☎: 708-677-4700; FAX: 708-677-0394.

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### WANTED: VARIAN EPR UNIT.

I already have the magnet and power supply. Contact:  
Tim Usher, Department of Physics  
California State University  
5500 University Parkway  
San Bernardino, CA 92407-2397  
☎: 714-880-5410; Fax: 714-880-7005  
Email: tusher@wiley.csusb.edu

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### AVAILABLE: VARIAN V 4500 MODULES.

Modules for the Varian V4502 EPR spectrometer are available from G. R. or S. S. Eaton at the University of Denver. E-Mail: GEATON@DUCAIR.BITNET.

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### AVAILABLE: BOXCAR AVERAGER

An inexpensive boxcar averager designed for use in electron spin echo (ESE) spectrometers is available from the University of Denver. At slow repetition rates it

gives about two orders of magnitude better S/N than the well-known PAR 162/164 boxcar. Contact Richard Quine at the University of Denver, Denver, CO 80208 USA ☎: 303-871-2419.

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### AVAILABLE: VARIAN 620L BOARDS.

A full set of boards for the Varian 620L computer is available.

Contact Sandra or Gareth Eaton at the University of Denver. E-mail: seaton@ducair.bitnet.

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### WANTED TO BUY: USED EPR SPECTROMETER.

A unit such as a Varian E-4 or E-9 would be ok. Electromagnet (or cavity) not necessary.

Contact Mark Rubinstein at the Naval Research Laboratory, Washington, DC 20375, USA  
☎: 202-747-4207.

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### TEMPO DERIVATIVES FREE!

We have small amounts — 50 to 200 mg each — of unique derivatives of TEMPO to give away: 4-nitro-, 4,4-dinitro-, 4-chlor-4-nitro-, 4-brom-4-nitro-, 4-iod-4-nitro-, 4-hydroxy-4-butyl-, 4-hydroxy-4-hexyl-. Also, there are some amounts of corresponding nonoxidized amino compounds containing the 4-nitro group. Contact :

Anatol E. Myshkin,  
N.N. Semenov Institute of Chemical Physics  
of the Russian Academy of Sciences,  
Kosygin str., 4, 117977  
Moscow V-334, RUSSIA

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### OFFERED: VARIAN FIELD SCAN CONTROLLER CARDS

Any Varian magnetic field controller can be modified to permit control of the magnetic field by a computer. A fully documented printed circuit card and controller modifications is available from the University of Denver.

Contact: Richard Quine ☎: 303-871-2419.

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### AVAILABLE: STANDARD LI-LIF SAMPLES

Samples of extremely pure Li-in-LiF crystals containing small spherical or variously shaped "massive" metal particles of Li are stable markers of intensity and other EPR characteristics (up to 600C). Samples with either small or large particles are available. These samples, which were described in the EPR Newsletter (vol. 4, No. 2, Summer, 1992, p. 8), can be used in a

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Published at the Illinois EPR Research Center (IERC), Urbana, IL 61801, USA

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variety of EPR and NMR investigation — for example, for standards, analysis of magnetic fields, or education. The crystals are being made available to interested colleagues at a pro-forma price of US\$ 650-700 per kit (2 types of samples for various measurements), with package and marking by agreement. Additional information is available by request.

The technical contact is:

Dr. F.G. Chercasov, Kazan, Phys-Techn. Institut  
420029 Kazan Sibirsky tract, 10/7  
Tatarstan (Russian Federation) ☎: (8432) 39-30-87.

The administrative contacts are:

In Moscow: Dr. G.A. Denisenko, Institute of Crystallography, Leninsky pr., 59 Moscow 117333 RU; ☎: 7-095-135 6420; FAX: 7-095-135 1011. In Kazan: Dr. F. Gubin, 420020 Kazan Volodarskogo, 1-60, Tatarstan (Russian Federation). ☎: 8432-39-3087, telex: 224864 ptb su

## APPENDIX I. COUNCIL AND OFFICERS. INTERNATIONAL EPR SOCIETY

- **J.-J. André**, {(CRM.EAHP), Strasbourg Cedex, FRANCE};
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- **R.L. Belford**, {University of Illinois, Urbana, Illinois, USA}, **EPR Newsletter Editor**;
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- **E. de Boer**, {University of Nijmegen, Nijmegen, NETHERLANDS};
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- **S.S. Eaton, TREASURER**, {University of Denver, Denver, Colorado, USA};

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- **Ya S. Lebedev**, {Acad. Sci., Moscow B-334, RUSSIA};
- **R.P. Mason**, {NIH/NIEHS, Research Triangle Park, North Carolina, USA};
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- **M.C.R. Symons**, {University of Leicester, Leicester, UK};
- **D.D. Thomas**, {University of Minnesota Med School, Minneapolis, Minnesota, USA};
- **J.A. Weil**, {University of Saskatchewan, Saskatoon, Saskatchewan, CANADA};
- **H.C. Wolf**, {Universitat Stuttgart, Stuttgart 80, GERMANY};

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